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THE PSYCHOLOGICAL REVIEW.

PROCEEDINGS OF THE FOURTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, 1895.

REPORT OF THE SECRETARY AND TREASURER FOR 1895.

The fourth annual meeting of the American Psychological Association was held at the University of Pennsylvania, December 27 and 28, 1895, that place having been selected with reference to the simultaneous meetings of the American Society of Naturalists and other affiliated societies. There were present the following members: Baldwin, Cattell, Chrysostom, Farrand, Fullerton, Gardiner, Griffin, Hyslop, James, Ladd, MacDonald, Marshall, Miller, Mills, Newbold, Nichols, Patrick, Sanford, Seth, Shaw, Strong, Warren and Witmer—twenty-three in all. Morning and afternoon sessions were held on both days, President J. McKeen Cattell presiding. Abstracts of the papers presented so far as they have been received by the Secretary are appended.

At the regular business meeting and in the intervals of the regular program, the following business was transacted. Election of officers for the ensuing year: *President*, Prof. George S. Fullerton; *Secretary and Treasurer*, Dr. Livingston Farrand; *Members of the Council*, Profs. E. H. Griffin and E. C. Sanford. Elected to membership on nomination of the Council: Dr. H. Austin Aikins, Western Reserve University; Dr. C. H. Bliss, University of the City of New York; Dr. Franz Boas, Museum of Natural History, New York; Prof. E. D. Cope, University of Pennsylvania; Prof. J. E. Creighton, Cornell University; Prof. Warner Fite, Williams College; Mr. J. E.

Lough, Harvard University; Prof. C. S. Minot, Harvard Medical School; Dr. E. A. Singer, Harvard University; Dr. W. G. Smith, Smith College; Dr. Norman Wilde, Columbia University.

On motion of Professor Baldwin, the Association voted that a committee of five, including the President of the Association, be appointed to consider the feasibility of coöperation among the various psychological laboratories in the collection of mental and physical statistics, the committee to report at the next regular meeting of the Association. The following members were later appointed on this committee: Baldwin, Jastrow, Sanford, Witmer and Cattell (chairman). The question of the formation of a philosophical society or a philosophical section within the present Association was, after a brief discussion, referred to the Council with full power to act. It was voted that members attending the International Psychological Congress in Munich, in 1896, be empowered to act as delegates of the Association, when qualified by notice given by them to the Secretary of the Association. A vote of thanks for the hospitality shown by the University of Pennsylvania and the local committee of arrangements was unanimously passed. The time and place of meeting were, by vote, referred to the incoming President to be fixed by him in conference with the presidents of the Society of Naturalists and other societies meeting simultaneously.

REPORT OF THE TREASURER:

Receipts:

From retiring Treasurer (Prof. J. McKeen Cattell)	$127 17	
Dues	180 00	
Sale of Proceedings	50	
		$307 67

Expenditures:

Printing	$13 60	
Postage	7 15	
Stationery	1 73	
Expressage	90	
		$23 38
Balance on hand		$284 29

Of this amount $100.00 is on deposit in the Mechanic's Savings Bank, Worcester, Mass., and $158.00 in the Worcester Institution of Savings. These deposits have drawn interest to an estimated amount of $7.00.

Audited by the Council and found correct.

E. C. SANFORD.

Secretary and Treasurer, 1894–95.

ABSTRACTS OF PAPERS.

(1) *Address of the President.* By PROF. J. MCKEEN CATTELL, Columbia University.

The address reviewed the history and recent progress of psychology and the part played in its development by experiment and measurement. Psychology is by no means a new science, but its growth during the last few years has been rapid, and it now rivals the other leading sciences in productiveness of research and publication and in academic position. Science is either genetic or quantitative, and psychology is advancing in both directions. The problems that can be treated in the laboratory were reviewed, and it was claimed that these have added directly and indirectly new subject-matter and methods, have set a higher standard of accuracy and objectivity, have made some part of the subject an applied science with useful applications, and have enlarged the field and improved the methods of teaching psychology. In conclusion, the relations of psychology to the other sciences and to philosophy were reviewed, and their interdependence was emphasized.

[This address is printed in the present number of THE PSYCHOLOGICAL REVIEW.]

(2) *Psychology and Physiology.* By PROF. GEORGE S. FULLERTON, University of Pennsylvania.

This paper was in a sense a sequel to the paper read two years before, entitled 'The Psychological Standpoint.' It attempted to draw the line between two sciences which touch each other closely, and was divided into two parts. The first part

assumed the 'automaton' theory of mind to be the true one, *i. e.*, the theory that mental states form no part of the sensory-motor arc, but are, so to speak, parallel with neural changes. The second part assumed ideas to be either a part of the chain of causes resulting in bodily motions or a something standing outside of that chain and, as it were, breaking in upon it. The author expressed no opinion as to the truth of any one of these theories, but merely inquired where the line dividing psychology from physiology should be drawn in any case. He examined at length a standard work on physiology, that of Professor Foster, and showed that dearth of established physiological data forced the author constantly to abandon his own field and take to psychology. In general, he maintained the thesis that psychology is sufficiently marked out from other sciences by the method it must employ, the method of introspection, observation and experiment, and interpretation; and he deprecated the introduction into text-books on physiology of psychological material as tending to conceal lack of physiological knowledge and to lead to confusion as to the boundaries of the two sciences. [The paper appeared in the January number of THE PSYCHOLOGICAL REVIEW, 1896.]

(3) *Series of Physical and Mental Tests on the Students of Columbia College.* By DR. LIVINGSTON FARRAND, Columbia University.

The tests described are made on the undergraduates of the College at entrance and repeated on the same students at the end of their Sophomore and Senior years.

The object of the tests is to obtain a record for comparative purposes of certain mental and physical characteristics of the students at different times during a period of rather active intellectual growth and at the same time to furnish material for a statistical study of the particular points examined. Stress is laid to a certain extent upon the more purely mental inquiries, such as memory, rate of perception and motor response, accuracy of perception, color vision, etc., but enough physical tests are included to afford a comparison between bodily and mental development, if any relation between the two exists.

(4) *Neuro-Social Data.* By DR. ARTHUR MACDONALD, Bureau of Education, Washington.

TABULAR STATEMENT GIVING QUANTITATIVE MEASUREMENTS OF SENSIBILITY IN PERSONS OF DIFFERENT AGES AND DIFFERENT CLASSES OF SOCIETY.

No.	Classification of Individuals.	Number of persons.	Ages and average ages.	Average least sensibility to distance (locality) bet. two points on volar surface of wrists.		Average least sensibility to heat on volar surface of wrists.		Average least sensibility to pain (by pressure) on temporal muscles and on palm of hand.	
				r.wr.	l.wr.	r.wr.	l.wr.	right.	left.
		1	2	3	4	5	6	7	8
				mm.	mm.	cent.	cent.	kilos.	kilos.
I	Women (highly educated)	23	av. 38	17.3	16.2	2°.1	1°.7	1.253	1.224 (T. mus.)
II	Young Women (wealthy classes)	11	un. 30	13.6	12.4	4.6	4.4	2.9	2.4 (hand.)
III	Young Men (wealthy classes)	10	" 30	12.4	12.7	4.4	3.7	4.7	4.2 "
IV	Boston, Army of ?	35	av. 28	16.1	15.6			9.5	9.5 "
V	Washington School Children (boys)	526	6–18	16.3	15.5	3.9	3.8		
VI	Washington School Children (girls)	551	6–18	14.8	13.8	4.5	3.9		
VII	Boys (parents well-to-do)	205	6–18	16.2	15.2	4.0	3.9		
VIII	Boys (parents poor)	119	6–18	16.6	15.9	4.0	3.7		
IX	Girls (parents well-to-do)	183	6–18	14.3	13.5	3.9	3.5		
X	Girls (parents poor)	133	6–18	14.9	13.8	3.9	3.6		
XI	Boys, bef. pub.	318	6–14	15.7	14.9	3.9	3.6		
XII	Boys, aft. "	208	15–18	17.2	16.3	4.5	4.2		
XIII	Girls, bef. "	186	6–12	14.5	13.8	4.8	3.8		
XIV	Girls, aft. "	362	13–18	15.1	14.0	4.3	4.0		
XV	Col. Chil., boys	33	6–19	13.9	13.5	2.0	1.7		
XVI	" " girls	58	6–16	15.2	14.1	2.5	2.4		

The tests for temperature discrimination were made with Eulenberg's thermæsthesiometer; those for pain with the author's own algometer applied to the temporal muscle. All the psychical conditions were made as uniform as possible, especially with the children. Should these results be confirmed by experiments on larger numbers of individuals, the following statements would be probable:

Middle-aged women of the educated classes are much less

acute in the sense of locality on the wrist, but much more acute to heat than young women of the wealthy classes (Nos. I. and II., columns 2, 3, 4, 5, 6).

Young men of the wealthy classes are much more sensitive to locality and pain than the men in the Boston Army of the Unemployed (Nos. III. and IV., columns 3, 4, 7, 8).

Young women of the wealthy classes are much less sensitive to locality and heat, but much more sensitive to pain than young men of the wealthy classes (Nos. II., III., columns 3, 4, 5, 6, 7, 8). As to pain, it is true in general that women are more sensitive than men, as shown in a former investigation. But as remarked then, it does not necessarily follow that women cannot endure more pain than men.

Boys are more sensitive to locality and heat before puberty than after. Girls are more sensitive to locality before puberty, but their sensibility to heat is about the same before and after puberty (Nos. XI.—XIV., columns 3, 4, 5, 6).

Colored boys are more sensitive to locality and heat than white boys. Colored girls are less sensitive to locality, but more sensitive to heat than white girls (Nos. VI., and XVI., columns 3, 4, 5, 6). Colored boys are more sensitive to locality and heat than colored girls (Nos. XV. and XVI., columns 3, 4, 5, 6).

The left wrist is more sensitive to locality, heat and pain than the right wrist; only one exception. (No. III., columns 3, 4).

(5) *An Experimental Investigation of the Processes of Ideation.* By MR. OLIVER CORNMAN. Introduced by PROF. LIGHTNER WITMER.

(6) *On Direct Control of the Retinal Light.* An informal Communication by PROF. GEORGE T. LADD, Yale University.

After a few explanatory remarks Prof. Ladd presented the following syllabus of experiments on the phenomena in question which he illustrated by reading extracts from one of the detailed reports secured by one of his experimenters.

VOLUNTARY CONTROL OF THE EIGENLICHT.

Be seated in a quiet room, with the face turned away from the direct light, and shut the eyes long enough to let the after-images fade away before beginning the experiment.

In a preliminary way, note the presence of the 'Eigenlicht,' and record your opinion as to its (1) color, (2) persistence and (3) shape or distribution.

If successful in this, try the following:

EXPERIMENT I.—By persistent and attentive willing, arrange the color-mass of the 'Eigenlicht' into the shape of a cross composed of two equal bars at right angles, thus:

Record your experience in regard to (1) the time it took to produce the cross, (2) how long it could be retained, (3) modifications of shape, if any, (4) color, and (5) effect of fatigue.

If successful in the above, try the following:

EXPERIMENT II.—Produce, as in Exp. I. (1) a circle, (2) two concentric circles, and (3) a triangle.

Record results in full.

EXPERIMENT III.—Try to produce the circle successively in the colors red, green and violet. Note your power to control the color by will.

EXPERIMENT IV.—Try to project the image of the circle in each of the above three colors separately on a blank sheet of white paper, and note what you see.

Try Exp. I. twice a day for ten successive days (morning and evening), and record date, time of the day, and duration of the experiment.

(7) *Consciousness and Time.* BY PROF. C. A. STRONG, University of Chicago.

The paper presented objections to the account of the relations between consciousness and present time given by Professor James in his Presidential Address at the Princeton meeting (December, 1894), and suggested an alternative account.

Professor James held that the present instant is a mere boundary line between the past and the future; that both the time

consciousness is *in* and the time consciousness is *of* must be durations or intervals, and that consciousness must therefore include within its span those portions of the past and of the future which lie nearest to the present instant. Hence the view that "there is literally no such datum" as that of present time, and that "past and future are already parts of the least experience that can really be." Hence, also, the need of assuming, in addition to the simultaneous unity of consciousness implied in the perception of likeness or difference, a successive unity, as implied in the perception of passing time.

In opposition to this account it was urged that, since the present instant is a mere boundary line, an interval or duration may be considered *abstractly*, from the point of view of that instant, and it will then appear to consist of a portion of the past plus a portion of the future; but that, if we wish to consider it *concretely*, and in the way it actually happened, we must conceive it as a line of successive presents, as an onward progress from an earlier present to a later present. Though present time is a point, it is not a resting, but a moving point, and it is this character of motion which affords the room consciousness needs in order to exist. Though change is thus a character of present time and of consciousness which is in it, consciousness may be in present time without being aware of change; for change, when real, is always infinitesimal, an invisible feature of the histology of consciousness.

The consciousness of the succession of two feelings cannot arise simultaneously with the first, nor midway between the two, but only when their succession is an accomplished fact. This consciousness is thus in its nature retrospective, and the relation is perceived between images existing in consciousness simultaneously. The consciousness of succession therefore implies only a simultaneous unity of consciousness, the same unity implied in the consciousness of likeness or difference; not a successive unity, which is a monstrosity, a contradiction in terms. Knowledge even of the nearest past is representative, not intuitive, and involves no self-transcendence except that involved in ordinary memory.

[This paper appears in THE PSYCHOLOGICAL REVIEW for March, 1896.]

(8) *Some Conditions of Will Development.* By BROTHER CHRYSOSTOM, Manhattan College.

The conditions of Will Development naturally fall under two heads: *intrinsic*, or such as are part and parcel of the voluntary agent; and *extrinsic*, or such as act upon him from without. The first of the intrinsic conditions is the nature of the will itself, which, according to the testimony of consciousness, is indetermined at least in the means which it employs to attain a given end. The objection against such testimony raised in the name of Double Consciousness does not hold, for it is based upon a confusion of the *idea of the ego* with the *ego*, or self, the former, however, varying with the normal or pathological state of the subject. A *succeeding* state of consciousness cannot *result* from an *antecedent* state, since the latter has already passed away. Hence a *unity* of subject must be granted; but, since it is variously affected, its phenomena are *many*. The subject is therefore, really distinct from its phenomena, the *ego* from its idea.

The will is, however, determined to a certain degree by acquired habit or disposition and by intellect. Indirectly, heredity exercises a marked influence over it. The law of heredity applies with special force to the exercise of external sense and of imagination. Its influence is modified by environment, and this, in turn, is partly subject to will. Herein lies the great opportunity of teacher and pupil, the former aiding the latter to build up a manly and well-balanced character, and both utilizing for this end the occasions presented by the events of daily life.

(9) *A Psychological Interpretation of the Rules of Definition in Logic.* By PROF. ALFRED H. LLOYD, University of Michigan.

This paper, though in the hands of the Secretary, was omitted for lack of time.

(10) *Discussion on Consciousness and Evolution.* By PROFS. WILLIAM JAMES, E. D. COPE, J. MARK BALDWIN, CHARLES S. MINOT AND GEORGE T. LADD.

[It is hoped that this discussion may be printed in full at some later time.]

(11) *An Experiment on the Effects of the Loss of Sleep.* By Prof. G. T. W. Patrick, University of Iowa.

The patient, a healthy young man of 28, accustomed to regular sound sleep of eight hours, abstained wholly from sleep for ninety hours, having watchers all the time. At intervals of six hours tests were made upon him in respect to pulse, temperature, weight, steadiness, discrimination-time, simple reaction-time, discrimination of taste and smell sensations, sharpness of vision, lower and upper threshold of pain, strength of grip and pull with dynamometer, memory and attention, time of adding columns of figures, discriminative sensibility of the skin, muscle sense, motor ability, fatigue, pulse after fatigue, measurement and analysis of urine. At the end of ninety hours the subject was allowed to sleep. He slept soundly ten and a half hours and awoke wholly refreshed. He made up altogether but 25% of the sleep lost.

The result of the various tests and their comparison with normal condition will be published in full later. Persistent hallucinations of sight were one marked result of the sleep fast. Pulse, reaction-time and muscular strength decreased. The weight of the subject, sharpness of vision, and discriminative sensibility for taste and for sound increased.

During the ten and-a-half hours' heavy sleep which followed the experiment, the subject was awakened every hour for the purpose for ascertaining the depth of sleep and constructing an 'absolute' sleep curve to compare with the normal sleep curve. The subject was awakened by an electric current passing through the leg, the strength of current necessary being taken as a measure of the depth of sleep. The deepest sleep was found at the end of the second hour, next the first hour, then the third hour, decreasing then rapidly till waking.

(12) *Further Researches on the Psychic Development of Young Animals and its Physical Correlation.* By Prof. Wesley Mills, McGill University.

The author announced that he had made investigations on several other animals, viz: The Mongrel Dog, the Cat, the Rabbit, the Guinea Pig, and on Birds. The subjects had been

treated as in his first contribution, on The Pure-Bred Dogs, and the papers embodying the facts, etc., were now in the press. As the handling of the subject in its present form involved an enormous mass of details he would not attempt more than the mere announcement of his work now, but hoped to read a generalized account of the whole at the next meeting.

(13) *Variations in the Patellar Reflex as an Aid to the Mental Analysis.* By PROF. LIGHTNER WITMER, University of Pennsylvania.

(14) *Experiments on Induced Hallucinations.* By PROF. JAMES H. HYSLOP, Columbia University.

The experiments reported in this paper were undertaken at my suggestion by a lady acquaintance whose experiences in early life suggested the possibility that looking into a crystal would induce hallucinations. She herself was doubtful about the undertaking and disbelieved in its possibility. The trial, however, showed that they would occur very easily, and twenty-three of them were recorded and described as having some interest. Some of them appeared to be located on the surface and some to originate from the center of the crystal. Some were clearly reproductions of past experiences or scenes modified by association or the addition of materials not in the original experience. One especially seemed to show association between two possible experiences of a different type, but without any element of recognition. All of them exhibited imagery which illustrated the constructive action of dreams, and emerged as capriciously and as independent of the present mental state as dreams.

The two cases in which coincidental features were afterward discovered represented nothing of an objective value in this respect and deserved mention only as subjective facts which occultists might confuse with objective evidence. In other respects their value could only be to show the existence of an influence by the crystal to produce, under proper conditions, genuine hallucinations and to show the capricious character of the effects. (This paper will appear in full in the *Proceedings of the Society for Psychical Research.*)

(15) *Cases of Dream Reasoning.* By PROF. W. ROMAINE NEWBOLD, University of Pennsylvania.

Prof. Newbold reported three cases of what is loosely called dream reasoning. The first occurred in the experience of Dr. W. A. Lamberton, Professor of Greek in the University of Pennsylvania. In the spring of 1870 he worked for several weeks upon the problem: Given an ellipse, to find the locus of the foot of the perpendicular let fall from either focus upon a tangent to this ellipse at any point. Finding all attempts at an analytical solution fail, he gave it over, intending to return to it when his thoughts had got out of the rut in which they had been running. About a week later upon awaking one morning he saw projected upon a blackboard in his bedroom a complete figure containing not only the lines given by the problems, but also a number of auxiliary lines, thus giving at a glance a geometrical solution of it. The case presents two special points of interest.

In the first place, it proves the existence of complex processes corresponding to those of ordinary reasoning, but existing apart from the personal consciousness. It is impossible to determine whether these processes took place during sleep or subconsciously in waking life. Second, the sensory externalization of the solution is a most curious feature. Professor Lamberton is a very poor visualizer and has never in his life had any other hallucination.

The other two cases reported were experiences of Dr. H. V. Hilprecht, Professor of Assyriology in the University of Pennsylvania. When a student under Professor Delitsch he dreamed that the real meaning of the name Nebuchadnezzar was 'Nebu protect my boundary,' deriving the element 'kudurru' from the, at that time, little known verb 'kadâru,' to enclose. This explanation has been universallv accepted. This easily explicable case is of interest chiefly in view of a later and more remarkable dream.

In March of 1893 Dr. Hilprecht dreamed that an Assyrian priest appeared to him and informed him that two fragments which he had been in vain endeavoring to decipher belonged together and were portions of a votive tablet erected by King

Kurigalzu. This was found to be true. Other details in the dream could be neither verified or disproved. No information was given in this dream which could not have been reached by normal processes of reasoning, but its dramatic form makes it most interesting. We are compelled to suppose that the two items of information—namely, that the fragments were parts of one original and that that original was a votive tablet—were reached by normal associative processes and that the old priest and other dramatic details were afterwards thrown about the conceptual elements as one drapes a gown on a lay-figure. This would involve the assumption of a translocation of the time series; the conclusion must have been first given and the dream must have been constructed, as it were, backwards. For such time hallucinations in dreams there is considerable independent evidence.

ADDRESS OF THE PRESIDENT BEFORE THE AMERICAN PSYCHOLOGICAL ASSOCIATION, 1895.

PROFESSOR J. McKEEN CATTELL,

Columbia University.

In the struggle for existence that obtains among the sciences psychology is continually gaining ground. We bear witness to the fact meeting here on terms of equality with the other natural sciences. This Association demonstrates the organic unity of psychology, while the wide range of our individual interests proves our adjustment to a complex environment.

While our confidence in the future of psychology rests on a knowledge of its intrinsic vitality, we are able for the convincing of others to offer the brute argument of material success. The academic growth of psychology in America during the past few years is almost without precedent. The work begun by James at Harvard, Ladd at Yale, and Hall at Johns Hopkins not more than about fifteen years ago has become an important factor in our universities. Psychology is a required subject in the undergraduate curriculum wherever studies are required, and among university courses psychology now rivals the other leading sciences in the number of students attracted and in the amount of original work accomplished.

In addition to the objective test of university recognition we may regard productiveness in publication. There are in America three journals of general science, in all of which psychology is treated as are the other sciences, and there are special journals as follows: mathematics, 3; astronomy, 3; physics, 1; chemistry, 2; geology, 2; botany, 2; zoölogy, 1; physiology, 0; psychology, 2. A comparison of these journals will not discredit those devoted to psychology; and it should be noted that we have in addition to these at least two journals of philosophy and two journals of education in which psychology occupies a

prominent place. It would be difficult to select by an objective criterion the most important books published in America during the past ten years, but if we may regard the judgment of foreign nations as the most probable verdict of posterity, the books written by members of this Association will stand well to the front among American contributions to science.

We must admit that the rapid growth of psychology in America has been due to conditions of the soil as well as to vitality of the germ. The more complete absorption of the college president by executive work has made necessary the transferring of his former prerogative of teacher of philosophy to the special student, while the development of the university with elective courses has permitted the easy introduction of a new study.

It follows that a comparison of the progress of psychology in America with its progress in other countries is less flattering to our *amour propre* as psychologists than to our patriotism. Still Germany maintains its prestige in psychology, and psychology maintains its prestige in Germany. Psychological courses are an increasingly large part of the philosophical courses, and the laboratories of psychology are being acknowledged as equal in rank to those in other sciences. There are two excellent journals of psychology, one of which is attracting part of the best work formerly published in physiological and physical journals. In France the *Année psychologique* bears witness to much recent work in experimental psychology, while interest in social, individual and pathological psychology is unabated. In England the traditional psychology is being enriched by absorption of the most important foreign work, while new contributions are offered on the side of philosophy and on the side of the biological and the medical sciences. In Russia, in Scandinavia and in Italy professorships and laboratories are being established.

While the recent progress of our science has been great, we do not admit that psychology is a new science. It is not a 'sport,' not even a fortuitous variation. If science is to date from the year of 'the master of those who know,' then we may take pride in the beginnings of psychology whose foundations

were more securely laid by Aristotle than those of any other science. Like the little boy answering the first question of the Catechism we may say "God made one foot big and I growed the rest." But with our superior knowledge of embryology we may further believe that we did not start even as an infant of the size of the famous one in 'Midshipman Easy,' but began our inarticulate growth long before 'mewing and puking' we came hither.

Even the 'new psychology' began at the beginning, and developed *pari passu* with the other sciences. Take, for example, a subject, not of leading importance, but typical of the problems studied in our laboratories—after-images. We have in after-images a case where we investigate the relations of the change in consciousness to the physical stimulus on the one hand and to the bodily organism on the other, where we make experiments and measurements on phenomena known to us only on the side of the individual consciousness, a case where we may hope for useful applications in education, in medicine, etc. We have in after-images phenomena related to and throwing light on a large range of mental activity—imagery, memory, hallucinations, space-perception, etc., and even of interest (see, for example, what Royce has to say in Vol. III. of the *Philosophical Review*) in their bearing on epistemology and metaphysics. Now after-images, phenomena thus typical of modern experimental psychology, were described by Aristotle with such exactness that we may feel sure that he himself made experiments upon them, whereas he refers to them as though they were familiar to his readers. Experiments upon after-images have been made by men eminent in widely separated fields of mental activity—by Augustine, Newton, Buffon, the elder Darwin, Goethe and many more—long before the date usually assigned to the development of psychology as an experimental science. I have perhaps selected a favorable example, but I think there are but few subjects now in course of investigation in our laboratories whose origin and gradual development could not be traced a long way back.

I may mention parenthetically that the earliest explicit formulation of the problems of experimental psychology, as I

understand them, is to be found not in Lotze, nor in Fechner, nor in Wundt, but in the most visionary and poetic of poets, himself a problem in heredity, character and intellect far beyond the reach of our psychology. Shelley wrote[1] about eighty years ago:

"A scale might be formed, graduated according to the degrees of a combined scale of intensity, duration, connexion, periods of recurrence, and utility, which would be the standard, according to which all ideas might be measured, and an uninterrupted chain of nicely shadowed distinctions would be observed, from the faintest impression on the senses, to the most distinct combination of those impressions; from the simplest of those combinations, to that mass of knowledge which, including our own nature, constitutes what we call the universe."

While psychology traces its descent through a long and noble line, we need not hesitate to mark a natural, but at the same time a notable, development under our own eyes and hands. A little while ago the psychologist might still say with Browning's *Cleon:*

"And I have written three books on the soul,
Proving absurd all written hitherto,
And putting us to ignorance again."

But we are past the time for systems of psychology; now handbooks of psychology are prepared. We have, like the other sciences, a small area lighted by ascertained fact and accepted theory, outside this is the penumbra, and beyond is darkness through which none of us pretends to see. We, indeed, estimate differently the importance of different departments and the hopefulness of different lines of research, but in this respect we only exhibit the human nature in whose study we are engaged. The student of mechanics proposes to account for all physical phenomena by Newton's laws, the student of electricity by electric vibrations, etc. An eminent chemist recently remarked that chemistry is evidently the basis of psychology.

It is, however, possible that we over-emphasize the differences that do exist. Certainly there is no member of this Association who believes that science should be a *tohu-wabohu* of facts, nor any who believes that reasonable theories can be de-

[1] Shelley's Works, Forman's Edition, VI., 285. *Speculations on Metaphysics.*

vised without regard to facts. Probably none of us would claim that he could draw a straight line and say: "on this side is science, on that side is philosophy." Possibly none would say: "these observations have no scientific validity, because they rest on introspection," or "these determinations have no psychological interest, because they are mere measurements." Rather we all join in the admirable words of our President at the New York meeting:

> "Let us all always be just; nay, let us be something more than merely just; let us be generous. And let our generosity include all workmen of all times, with their works, from Aristotle's *De Anima* to the latest thesis by the youngest aspirant for the degree of Doctor of Philosophy."

While science advances along many paths, there are certain highways most traveled and most direct. What these are in psychology at the present time the analogy of the other sciences may perhaps indicate. We cannot, I think, doubt, but that modern science is either quantitative or genetic. I say 'either' because there is at present a partial divorce between the physical sciences in which the relative permanence of the phenomena makes the quantitative point of view easy and the genetic difficult, and the biological sciences in which the converse conditions obtain. This divorce is, however, due rather to our ignorance than to our knowledge. In the progress of science the physical sciences will become increasingly genetic and the biological sciences increasingly quantitative. Astronomy learned the laws of Kepler before it learned the nebular hypothesis. The physicist could not find in the star-dust the problems of modern physics and chemistry. There is variation and survival in the inorganic as well as in the organic world. The biologist in turn should no longer rest content with describing the genesis of species and of individuals, but should measure variations and changes, and determine causal relations by the methods of exact science.

It would seem likely that methods prevailing in the other sciences should also hold in psychology, more especially as we must admit that most of these sciences have passed through the stage in which psychology now is—or until recently was—and have reached a clearer self-consciousness. But we do not need

to depend exclusively on the often delusive argument from analogy. Recent work in psychology speaks with sufficient emphasis in favor of tracing the genesis and the degeneration of mental states on the one hand, and their quantitative definition on the other.

I think we may claim without undue self-assertion that the most important contributions to genetic psychology made during the past year have come from members of this Association. Baldwin has treated with an elaboration hitherto unequalled, the mental development of the child and of the race; Stanley has studied the evolutionary psychology of feeling; and Royce has analysed the genesis of the contents of the individual consciousness in its dependence on social environment and evolution with great acuteness. While much of the definite outcome is still *sub judice*, there is none to question the validity of the genetic method.

When we turn to the quantitative method in psychology we find, I fear, more difference of opinion. We have, indeed, our many laboratories, all of which are at least silent witnesses in its favor. But several of our leading members have expressed, at the meetings of this Association and in their published writings, doubts as to the validity, or at all events as to the value, of mental measurements.

Now it is easy to adopt a skeptical point of view in such a matter. By the nature of things men of science and students of philosophy are quit of the enthusiasm of the proselytizer and reformer. The every-day up-hill work of the laboratory is scarcely more stimulating than the routine of the factory or of the farm. Each, as Clough's *Dipsychus* tells us,

> "Must slave, a meager coral-worm
> To build beneath the tide with excrement
> What one day will be island, or be reef,
> And will feed men, or wreck them."

But this skeptical point of view can be applied with equal success and equal futility to any science, or to the conduct of daily life. We may, if we see fit, wonder why anybody does anything. By common consent the discovery of argon in the atmosphere was the most important scientific advance of the

past year, but it has not as yet been found that argon is of any practical use, and, so far from helping us to understand the universe, this substance but adds to its apparent complexity. Why not let the last decimal be, and enjoy the air in the springtime—or devise means to keep out of it if one happen to live near Boston?

Münsterberg has written: "Die Messung ist niemals Selbstzweck in der Psychologie, eben dadurch unterscheidet sie sich von der Physik." Now it seems to me, on the contrary, that measurements have just the same place in psychology as in the material sciences, except in so far as they have not been as yet so successfully prosecuted. The immediate end of science, whether physical or mental, is to describe the world—it may be added, and to explain it, though if we had a complete and unified description, it is not clear what would be left to explain. We wish to describe the world, partly because our knowledge can be applied in useful ways, and partly because the effort satisfies mental needs, as do art and religion. Measurements in the physical sciences are in a way means to the ends mentioned, but in so far as a description of the world is an end in itself, measurements are a part of this description, and by far the most exact, general and economical method of description hitherto devised.

It may be that in psychology the field for quantitative definition is more limited than in the case of the physical sciences. The lack of many or wide-reaching numerical formulas expressing mental relations may be due not so much to the recentness of our attempts to discover these as to the nature of the subject-matter with which we are dealing. Indeed it is evident that as a mere matter of definition we have to a large extent limited the physical sciences to a quantitative treatment of time, space and energy, relegating qualitative differences to consciousness. But it is also true that the quantitative point of view in physical science has only gradually and but recently emerged from a chaos of animistic and teleological conceptions. The unitary point of view developed by physical science is truly a matter for marvel. The awe inspired in the great mystic of rationalism by the starry heavens and the moral law may well pervade the student of physics in the presence of the unforeseen grandeur and simplicity of his own handiwork.

It is, indeed, true that measurements give as yet only a partial description even of the physical world, and the progress of science may make this less rather than more adequate. The ether, elastic and solid as it is supposed to be, seems on the point of breaking under the load laid upon it. Atoms are stumbling blocks, however small we may assume them. Ludwig, chiefly instrumental in establishing for a while a mechanical theory of living tissues, lived long enough to witness the emergence of a neo-vitalism. Indeed Ludwig himself, on being asked why he did not prepare a new edition of his *Physiology* said, "Such a work must be written by a young man; an old man is too well aware of his ignorance." We are as the earth in the Hebrew cosmogony, when the light had been separated from the darkness, but the sun had not yet been set in the firmament.

Both the success and the failure of material science may encourage the experimental psychologist. He may hope to accomplish much by measurements, even though he may foresee that he will not accomplish everything. Whether he be entrusted with one talent or with many, he can serve in better ways than in standing and waiting.

This commingling of hopeful endeavor and hopeless limitation drawn from the analogy of physical science may be more directly deduced from the work hitherto accomplished in the psychological laboratory. This has indeed been called trivial and pedantic, and has been wounded even in the house of its friends. Statistics, averages and probable errors seem remote from the complex fulness of human nature. There seems imminent danger from a neo-scholasticism with measurements in the place of definitions.

Now when it is said that nothing has been done beyond measuring time, intensity, and complexity of sensations, movements and mental processes, the reply may readily be made that nothing further can be desired. Physical science measures only time, space and energy. If psychology can do as much it has the same abundance of individual problems; if it need do no more it has the same great simplicity as its goal.

The use of averages and probable errors in psychology is

not pedantic, except when attempted by those not acquainted with their meaning. The probable error tells us just how many experiments we ought to make and just what reliance may be placed upon them. The theory of probabilities, enabling us to measure both our knowledge and our ignorance, is one of the great achievements of the human intellect, and is equally applicable in sciences attaining varying degrees of exactness. It was, indeed, pedantic for Helmholtz to give the velocity of the nervous impulse as 37.4927 m. per second, when the average velocity and the individual variations are not known within tens of meters. But it is exactly an application of probable errors that would prevent such pedantry, and if the greatest of physicists has on occasion indulged in it, we need not too severely blame the student preparing his doctor's thesis for carrying his average a decimal beyond what is warranted by the theory of probabilities.

In some cases a very considerable degree of accuracy is attainable and necessary in psycho-physical measurements. Thus doubling the intensity of the stimulus shortens the reaction-time about 0.001 sec., and if we wish to determine the relation between intensity of stimulus and duration of reaction we must measure to the ten-thousandth of a second, and the averages and probable errors show that such a degree of accuracy is attainable. The apparatus used for the purpose in the psychological laboratory of Columbia College has this year been borrowed by professors in the physical department to measure the rate of fall of bodies in liquids, and it has resulted that the constancy of the physical motions is less than that of the psycho-physical processes.

Such problems—the correlations of quantities—are those ultimate in exact science, and in so far as they can be undertaken in psychology it becomes an exact science. It may be said that in the example given we are concerned with the nervous system rather than with consciousness. But even if this be exclusively the case it may be urged that a dynamics of the nervous system is essential to a final psychology. Further, the correlations of quantities may be investigated in cases in which we know the changes in consciousness, but are completely ig-

norant of the neural processes which may accompany them. Thus we all are familiar with the many investigations on the discrimination of differences in intensity. There is room for various interpretations of the meaning of a just noticeable difference, but by definition differences in sensation are equal if they be equally perceptible. We can find when differences are equally perceptible by determining the percentage of times in which they are in fact correctly perceived. But we can approach the problem from a new point of view, first defined, I believe, at the New York meeting of this Association, involving the correlation of mental magnitudes.

If differences be equally perceptible it takes equal times to discriminate them, and the less the difference in sensation the greater the time required. By measuring the time of discrimination it is possible to determine differences in the intensity of sensation. We can thus investigate the relation of the intensity of stimulus to the accuracy of discrimination (Weber's law), and can even use the method for the comparison of disparate sensations. We may find that the difference between red and blu is equal, say, to the difference between sensations due to lights from 10 and 1,000 candles, or even that the difference between the tones C and c is equal to the difference between certain visual sensations.

The appeal made to different minds by such problems as part of a worthy description of the world must of necessity vary with the individual mind. Our goals in religion, art, philosophy and science are not only wide apart, but they also shift even as we run. Our science and our philosophy are but as a doll in the arms of a little girl, who does not know what it means nor what the years will bring.

I think, however, that conclusive testimony may be advanced to prove that psychological experiment has had and will have both practical applications and an important share in psychology as a whole, whether regard be had to its individual development or to its relations with the other sciences.

Professor Burdon Sanderson, in his presidential address before the Ipswich meeting of the British Association, said that he was not aware of any useful application of experimental psy-

chology, and Professor Morley, president of the American Association, said, at the recent Springfield meeting, "science cannot change human natures or the social order." These selected representatives of science in England and America, however, both hold that science has an adequate end in the satisfaction of intellectual curiosity. On the other hand Franklin, the father of American science, speaks of new discoveries as important only because they tend "to extend the power of man over matter, avert or diminish the evils he is subject to, or augment the number of his enjoyments." Franklin's point of view may be regarded as materialistic, but science for the sake of science is in turn in danger of dillitanteism.

We may be glad that experimental psychology has practical applications in spite of quasi-official dicta to the contrary. In the United States more than one hundred and fifty million dollars, collected by enforced taxation, is spent annually on public schools in the attempt to 'change human natures.' President Eliot says that nothing is accomplished in these schools except the training of the memory, and his colleague, our retiring president, tells us that the memory cannot be trained.[1] Surely in education, which extends from birth to death, we can learn by experiments on the senses and the mind what may be done to fit the individual to his environment. It should not be forgotten that we not only hold the clay in our hands to mold for honor or dishonor, but we also have the ultimate decision as to what material we shall use. The physicist can turn his pig iron into steel, and so can we ours; but he cannot alter the quantities of gold and iron in his world, whereas we can in ours. Our responsibility is, indeed, very great. By one psychological experiment we injure the eysight of our children in the schools, and by another psychological experiment we discover the defect and fit glasses to correct it. It seems to me certain that experimental psychology has wide-reaching practical applications, not only in education, but also in medicine, in the fine arts, in political economy and, indeed, in the whole conduct of life.

[1] As Professor James said at the meeting, he only holds that native retentiveness is unchangeable. It was not, of course, intended in this paradox to adequately represent the views of President Eliot and Professor James.

It also seems evident that experimental psychology has recently become an important factor in the development of psychology as a whole, both by its actual contributions and by the changes in method to which it has given rise. The psycho-physical camel will never be able to exclude the psychological Arab from his tent, but it must be welcomed, or at least tolerated. A comparison of modern text-books of psychology, such as those by James, Ladd, Baldwin, and Dewey, with older works bears irrefutable witness to the introduction of the results of physiological and psychological experiment. I shall undertake the *argumentum ad hominem* in the case of James, who said at our last meeting that "curious phenomena of the dissociation of consciousness * * * throw more new light on human nature than the work of all psycho-physical laboratories put together." On taking down James' *Psychology*—which has breathed the breath of life into the dust of psychology—and turning at random to the even hundred pages, I find that the first is entirely taken up with the measurement of the temperature of the brain in relation to thought; the second is on continuity of consciousness with time measurements; the third a description of the bodily movements giving the consciousness of self; the fourth on the relation of the two hemispheres of the brain and of bodily movements to self-consciousness; the fifth on the relative intensity of sensations and images; the sixth on the association of ideas; the seventh on observations and experiments on the mistaken interpretation of sense-stimuli; the eighth on the relation of movements of the eyes to the perception of space; the ninth on the factors distinguishing the perception of reality; the tenth on instinctive actions; the eleventh on muscular sensations; the twelfth on hypnotic suggestion. These topics illustrate very fairly the field covered by modern psychology. They nearly all rest upon psycho-physical observations and experiments, and in cases where observations predominate it is evident that they will soon be superseded by actual experiments from our laboratories yielding quantitative results.

Even in directions where experiment has not yet offered considerable contributions, it has performed an important service in setting a standard of carefulness and objectivity. It may also be

urged that experiment serves as a stimulus and starting point for thought. Thus Wundt states that his theory of the development of the will and of its relation to 'apperception' had its origin in observations made during the course of experiments on the reaction-time. It requires peculiar genius to sit down at a desk and write out observations and theories that are new and true; they are more likely to occur during actual work of some sort. Further, there are many who can carry out experiments in the laboratory who are incapable of constructive work. The data obtained by them may be seen by others in their larger relations. The generalizations of a Newton must be based upon the observations of a Flamsteed.

The introduction of experiment has also made the teaching of psychology easier and more useful. Laboratory work by students is by common consent an important part of their training. Whether the experiments be in chemistry or in psychology may not greatly matter. In the chemical laboratory, when the course is intended for liberal training, the experiments are meant to educate the senses and the mind, rather than to give information concerning metals and acids. When the object of an experiment is not to learn what happens when two solutions are mixed, but to teach the student to observe what happens, we may perhaps claim that a psychological experiment has been undertaken. Whether experiments directed to the senses and the mind would serve better or worse than others for the purpose in view, or whether it is practicable to introduce a new study into the preparatory school or the early college years, are matters that can themselves only be settled by experiment. It is, however, certain that such preliminary work, or, lacking it, some experiments introduced into the course in psychology commonly offered and even required in the junior year, would enable the average student to follow this course with greater interest and intelligence, so that he would be less likely to regard it as:

> "A tale
> Told by an idiot, full of sound and fury,
> Signifying nothing."

I venture to maintain that the introduction of experiment

and measurement into psychology has added directly and indirectly new subject-matter and methods, has set a higher standard of accuracy and objectivity, has made some part of the subject an applied science with useful applications, and has enlarged the field and improved the methods of teaching psychology. In conclusion I wish to urge that experiment in psychology has made its relations with the other sciences more intimate and productive of common good.

In courses in physics, for example, certain psychological subjects, vision, hearing, etc., have always been included. The treatment has of necessity been inadequate, and the student, if not the teacher, may have left the subject with confused notions, *e. g.*, as to the distinction between light as a mode of motion and color as sensation. Or it may be incidentally stated that color, pitch and warmth are 'subjective,' while matter in motion is alone 'real.' Now the treatment of certain subjects in common with physics has set for the psychologist a higher scientific standard, whereas it may be hoped that the physicist has learned that processes of perception and thought are part of the real world which science as a whole must take into account.

In physiology the treatment of certain subjects in common must ultimately result in mutual benefit. Our host Fullerton showed this morning how largely the physiology of the nervous system leaves its proper field for that of psychology. The physiologist must face the problem as to whether consciousness shall be assumed in causal interaction with the nervous system. It may not matter greatly to us whether cerebral functions are located here or there, but it would be a survival or an atavism to hold that we can fully treat processes of perception, ideation, feeling or will without regard to sense organs, movements, paths of conduction and nervous centers, or even apart from metabolism and circulation of the blood.

In general biology, whose great problem is the development of life, zoology-botany and psychology cannot advance excepting hand in hand. Darwin did not hesitate to use consciousness as a *vera causa* in the preservation of species, and Cope, now presiding over our sister society, urges that it is a preëminent cause in their origin. Sensations, movements, in-

stincts and habits are prominent in any theory of the evolution of species, and they must be treated in common by physical zoology and psychology. The importance of these problems is borne witness to by the fact that we have selected them for special discussion to-morrow morning. For many the leading interest in organic evolution is in its application to social evolution, and it is scarcely necessary to mention the relation of psychology to sociology, which science is indeed simply collective psychology.

Psychology has long been and properly remains the gateway to architectonic philosophy. It may be that experiment cannot answer the final questions of philosophy, but the world-view of each of us depends increasingly on what the natural and exact sciences contribute to it. The white light of philosophy can only result from the proper commingling of the colors of the sciences. Systems of philosophy, elaborated prior to the development of modern science or without regard to this, may receive our admiration as poetry, but they cannot claim our adherence as truth. To allot to science those subjects concerning which we have knowledge, and to reserve for philosophy those questions concerning which we know nothing, is evidently subversive of philosophy. Epistemology, ethics, logic and æsthetics are regarded as philosophic disciplines, but they rest increasingly on psychology. Epistemology depends on the psychology of perception and may be nothing else. Works on ethics, logic and æsthetics take increasing account of psychological facts; indeed, as our knowledge increases, the distinction between a normative and a descriptive science becomes somewhat tenuous. The twilight of philosophy can be changed to its dawn only by the light of science, and psychology can contribute more light than any other science.

CONSCIOUSNESS AND TIME.[1]

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The question to which I invite your attention is this: What is present time, and what is the relation of consciousness to present time? The answer that naturally occurs to one is, that consciousness is *in* present time, that present time is *present* time, not past or future, and that there is an end of the matter. The answer given by Professor James in his Presidential Address a year ago, which is the answer of Shadworth Hodgson, is a very different one; and as this answer seems to me unsatisfactory, I should like, with your permission, to present my objections to it and my reasons for preferring the natural answer.[2]

According to Professor James, there is "literally no such datum" as that of present time. The present is merely a boundary-line between the past and the future, and is not itself extended or capable of containing anything real. The only real datum, the only thing that is ever really present to us, is a short bit of duration, an *interval* of time, extending a little way back and a little way forward from the present instant. Or, rather, the datum is the feeling that occupies this interval and has this duration. And there is a minimum duration which the feeling must have in order to exist at all. Such a minimal feeling, when reflectively examined, is found to consist of two sub-feelings, one earlier and the other later, and the feeling of their succession. Thus the simplest feeling we can have already includes the consciousness of change, of passing time. The boundary-line which separates the two sub-feelings is the pres-

[1] Read before the American Psychological Association at Philadelphia, December, 1895.

[2] Prof. James's address appeared in the PSYCH. REV. for March, 1895, pp. 105 ff; see esp. pp. 111–113. Mr. Hodgson's statement is found in his *Philosophy of Reflection* I., pp. 248 ff. The view criticised is also held by Fouillée, *Psychologie des Idées-Forces*, II., pp. 81 ff.

ent instant, and with reference to it the one appears as past and the other as future. Thus past and future are "already parts of the least experience that can really be."

But the consciousness of change, of passing time, is a relational state, and therefore necessarily unitary. Just as the consciousness of the difference of two things requires that they should both be present to a unitary state which knows them and their difference, so the consciousness of succession requires that the earlier and the later state should both be present to a single thought. And as the consciousness of likeness or difference implies a simultaneous unity of consciousness, a unity running, so to speak, across the stream, so the consciousness of change, of passing time, implies a successive unity of consciousness, a unity running a short distance up and down the stream. Such a successive unity is, to be sure, a mysterious thing; for the knowing state has to reach out beyond itself, and intuitively know together things that do not exist together. Yet such self-transcendence, such "presence in absence" we must nevertheless assume, if the relation of consciousness to time is to be made intelligible at all.

In presenting my objections to this account of the matter, I must point out, to begin with, that there are two distinct relations here involved: the relation of consciousness to the time in which it exists, and its relation to the time of which it is aware. I shall take for granted that consciousness does as a matter of fact exist in time, and shall inquire first as to the characters of the time in which it exists.

The present instant, as a mere boundary-line, is too small for consciousness to exist in: this, I think, is Professor James's doctrine. It must be freely admitted that the present instant is a mere boundary-line, and that consciousness, in order to exist at all, must have duration. But the consequence which is supposed to follow from this—namely, that consciousness, driven out of the present, can find room for itself only in a little bit of the past plus a little bit of the future—does not really follow from it at all.

This might appear, for one thing, from the consideration that the past means that which once was present, and the future that which will be present; that the reality of the past and the

future is thus derivative from the reality of the present; and that to deny the reality of the present is therefore to knock the bottom out of reality altogether. But it might be contended that this applies only to the 'specious present.'

That the consequence does not really follow, appears when we consider that the conception of an extended present involves the same false abstraction as the conception it is intended to replace. The two sub-feelings AB are supposed to be given at once, A being known as past and B as future. But this state of things exists, not for any finite length of time, but only for an indivisible instant, only at the instant x. Only at that instant is it true that A is entirely past and B entirely future. But it is in just such an instant that nothing can be real. When we look at the feelings AB from the point of view of this instant, we are conceiving the flight of time as arrested, and therefore considering the feelings in abstraction from real time. If we are to find room for consciousness, we must abandon the point of view of any single instant, and take up the innumerable points of view of the duration itself. We must remind ourselves that the feeling A has been present and the feeling B will be present; in other words, we must consider A and B as feelings that become successively present; or, rather, we must consider these feelings as parts of a stream of consciousness every instant of which becomes successively present. Only by substituting the point of view of the interval wy for that of the instant x, and only by considering this interval, not as a bit of the past plus a bit of the future, but as *a line of successive presents*, shall we succeed in considering the feelings concretely, and in the way they actually happened.

By adopting a sort of algebraic statement the case may be presented in its essence. Such a stream of consciousness, such a line of successive presents, may be conceived as composed of n parts, and these parts will always be successive, thus: 1, 2, 3 . . . . . $n-2, n-1, n$. However great the value assigned to n, the parts will always be successive. It is evident that from these essential relations there is in the nature of the case no escape. No fraction of a second can possibly be taken so small that all of its parts will be given at once. Succession, in other words, is

spun out infinitely fine, and the only thing that can be given at once is an indivisible instant.

Here doubtless some hearer says to himself that I have given away my case. I have sharpened the succession down to a point, and in so doing have left no room for consciousness. I reply that this objection rests on the very same false abstraction against which I have been protesting. For what sort of a point is it which we now have left? It is no longer a resting point, but a moving point; it is the onward motion of a point from an earlier instant to a later one; and what is such onward motion but actual duration? The resting point was a mere abstraction; it left out the motion, the onward passage, the fugitive quality, which is the essence of time, without which it would not be time at all; and since time itself was left out, there was naturally no room for consciousness. But the moving point is only another name for actual duration, and in present time, when so conceived, consciousness finds all the room it needs. In order adequately to conceive present time, we must combine the two conceptions of movement and a point. The conception of movement is necessary in order to render time's flight, its fugitive quality. The conception of a point is necessary in order to render its infinite successiveness.

But here, again, some hearer doubtless says to himself that I have given away my case in another direction. In modifying the conception of present time from that of a resting to that of a moving point, I have virtually admitted that change is directly given. And, if change, then the *terminus a quo* and the *terminus ad quem*, the two sub-feelings and their succession, the immediate past and the immediate future. I may reply by asking the objector to consider what sort of change it is which he here assumes, and what sort of change it is which is actually given. The change which he assumes is a finite change, the transition from feeling A to feeling B, these two feelings not being real at the same time. The change actually given is an infinitesimal change, the onward passage in the act of occurring—that onward passage in virtue of which we say that time is infinitely successive, that the succession is spun out infinitely fine. The fact is, that the succession is spun out

very much too fine to be visible to the naked eye of consciousness. The succession, in other words, enters into the tissue of consciousness, histologically speaking, but is not an obvious feature of its gross anatomy. Consciousness is in its nature a sort of change, conscious states are nothing if not events, but this is an account of what consciousness *is*, not an account of what we are conscious *of*. A sudden, brief pain is in its nature an event, a change, but what we are conscious of is not the change, but the pain. A changing consciousness, in short, is not the same thing as a consciousness of change.

I hope I have now met the nearest-lying objections, and made it clear that present time, when rightly conceived, furnishes all the room that consciousness needs. Reality, as we know it, may in fact be said to be *nothing but one ever-changing present*. So far is it from being true that "past and future are already parts of the least experience that can really be," and that there is "literally no such datum" as that of the present, that I think we may rather say that there is literally no other conceivable datum, and that the present is the only time that ever was, or is, or shall be.

I pass now to the second of the two relations, that between consciousness and the time of which it is aware. This relation may be disposed of briefly. Though consciousness exists only in the present, and the present is a moving boundary-line, yet it must be admitted that the time of which we seem to be directly aware is not a mere boundary-line, but an actual interval, an interval the parts of which are given not successively, but all at once. And this is true, in spite of the fact that the consciousness of this interval exists only in the moving boundary-line. Just as, in external perception, what is really given is only a subjective state, yet what we are for practical purposes aware of is a real world of space; so, in our consciousness of time, what is really given is only the moving boundary-line, but what we are for practical purposes aware of is, say, the last half-second, the 'specious present.'

The first point that requires to be settled is the temporal relation between the knowing state and the 'specious present

which it knows. *When*, with reference to the 'specious present,' does this knowing state exist? We have all along assumed that it, as well as other states of consciousness, truly exists in time. The view that the consciousness of time is itself timeless is a Hegelism which I should be loth to attribute to Professor James. When, then, does it exist?

Professor James's view seems to be that it exists midway between the two sub-feelings, in some sort after the first of them and before the second. At least it is only from this position that the knowing state would have the right to regard the first sub-feeling as past and the second as future. But has this state such clairvoyant power as to be able to foresee what the second sub-feeling will be, before this sub-feeling has actually appeared on the scene, or even to foresee that there will be a second sub-feeling at all? A direct intuition of the past seems marvelous enough, without assuming a direct intuition of the future. I know Professor James will reply that I am reading a separate individuality into the sub-feelings which does not exist in his account. My answer is, that such a separate individuality is inevitable, if the sub-feelings are truly to exist in time. If one sub-feeling follows the other in time, a knowing state that coexists with the first will have no inkling of the second, and no inkling of their succession. If the knowing state exists midway between the two, it will still have no inkling of the second sub-feeling or of their succession. Only when the second sub-feeling has appeared can there be a knowledge of the two sub-feelings and their succession. Only when the succession is an accomplished fact can a consciousness of that fact arise. In other words, the actual succession must precede the knowledge of the succession. When the knowledge arises, the feelings that succeeded each other are past and gone. But, if so, this knowledge is in its nature *retrospective*. The succession is not perceived between the feelings A and B as they occur, but between the images a and b which they leave behind. And psychologists have long been discussing the 'temporal marks,' discernible in these images, which prompt the mind to perceive between them the relation of succession.

This view of the case is so generally accepted, and Profes-

sor James himself has given so lucid an account of it in his chapter on Time, that I am at a loss to understand his now falling back into a radically inconsistent view. I can only attribute his lapse to the confusion, already referred to, between the finite succession of the feelings *A* and *B*, and the infinitesimal succession which enters into the tissue of each.

Dr. Ward, in his Britannica article, aptly expresses the view here defended, the view that a succession of ideas is not an idea of succession, by comparing the actual stream of consciousness to a horizontal line, and the consciousness of time to a vertical line erected upon it. We are aware of time, he says, not through the feelings *A* and *B* in the horizontal line, but through the images *a* and *b* in the vertical. Our knowledge of time thus involves a perspective effect, similar to that by which we perceive the third dimension of space. "We are aware of time," he insists, "only through the time-perspective."[1]

The lapse of time is, therefore, not directly experienced, but constructed after the event. The time we are directly conscious of is not the real time that elapsed. The succession of our feelings is a fact external to the feelings themselves. If it were not for memory, we should never have any consciousness of succession at all, any more than of past time. And this is true, because succession is essentially a relation between past and present, or between an earlier and a later past. We never lift ourselves up out of the stream of time and view it as a stream except representatively, except through memory. To wish to apprehend succession, or change, or the lapse of time directly, and not through memory, is as foolish as to wish to apprehend the past directly, and not through memory.

But now, if this account of the case is correct, it seems to me that the fiction of an intuitive knowledge of the immediate past and future falls to the ground of itself. Later states can have no direct and intuitive dealings with earlier states, for the simple reason that the two do not exist at once. When the earlier state is present the later state is non-existent, and when the later state appears the earlier one is non-existent. Our apparently direct consciousness of the immediate past is an illusion,

[1] Encycl. Brit., 9th ed., art. 'Psychology,' pp. 64–5.

of the same character as that which leads us to attribute extra-mental reality to material objects. To take this illusion seriously is to be guilty of a sort of naive realism in the field of time.

The impossibility of such a direct consciousness of past time appears, further, from the consequences to which it should lead if true. If we can be directly conscious of a feeling that occurred half a second ago, in spite of the fact that the feeling is now past and gone, why not also of a feeling that occurred a whole second ago, or a minute ago, or an hour, or a day, or a week? The consciousness would be in no wise more miraculous. Why cannot we be directly conscious of any past experience, no matter how remote? But, if such consciousness is not to be thought of, then for the same reason the direct consciousness of half a second ago is not to be thought of. Our consciousness of even the nearest past must be ideal, not actual; representative, not intuitive.

But again, if this is true, the successive unity of consciousness falls to the ground likewise. "In reality," says Dr. Ward, "past, present and future are differences of time, but in presentation all that corresponds to these differences is in consciousness simultaneously." But, if so, there is no need of a successive unity of consciousness to account for the consciousness of succession. Earlier and later states cannot be bound up into a successive unity, because they do not exist together, and because they are past and gone when the perception of succession arises. When this perception arises, the relation is perceived between images existing in consciousness simultaneously. It therefore implies only a simultaneous unity of consciousness, the same unity that is implied in the perception of likeness or difference; not a successive unity, which, to tell the truth, is a monstrosity, a contradiction in terms. Successive states of consciousness are not one with each other, but continuous with each other; we may speak of a continuity, but not of a unity. The only unity is the unity of that which is in consciousness at once.

A word, in closing, in regard to the broader issues involved in this discussion. The legitimate and necessary reaction from the psychological atomism of Hume and his school has led to the recognition of relational states, of the unity of consciousness, of

'mental synthesis.' This reaction was a necessary and legitimate one; these were features of consciousness which the English school overlooked: but it would ill become us, in interpreting them, to fail to imitate that sobriety and economy of thought which has always been characteristic of the English school. No psychologist has done more to illustrate and commend these qualities than Professor James. There is no one to whom we are so accustomed to look for plain, honest, intelligible psychology, and no one to whom we so seldom look for it in vain. We have not looked for it altogether in vain in this very matter. There is one mystification, the most insidious and fatal in this subject, from which Professor James's account is signally free. I mean the conception of 'mental synthesis' as involving an agent, who finds feelings apart and puts them together into a unity. When we turn from this mystification to the facts of consciousness, all that we find really given is the essential unity of the relational state itself. We enjoy these states when they arise; they constitute an increment to our intellectual being; we may even put ourselves in the way of getting them. But may Heaven preserve us from the arrogance of supposing that it is we who create them. We no more create them than we create the sensations which form their terms. We do not create them, but *are* them. And may Heaven preserve us, not less, from supposing that, being them, we may nevertheless transcend them and hold direct converse with feelings that are past and gone. Our knowledge of the past involves self-transcendence, but the self-transcendence is representative, it is ideal. A self-transcendence that is other than ideal is neither plain, honest, intelligible psychology, nor plain, honest, intelligible metaphysics.

STUDIES FROM THE HARVARD PSYCHOLOGICAL LABORATORY. (IV.)

COMMUNICATED BY HUGO MÜNSTERBERG.

The Physical Characteristics of Attention.

By R. MacDougall.

The researches here to be reported upon were concerned with the phenomena of functional disturbance which accompany various forms and degrees of perceptual and reflective attention.

The subject was seated in a comfortable position with body relaxed and eyes closed, beside a table upon which the instruments were placed. The conductor of the experiments, who gave the signals and applied the stimuli, stood at his back, by which arrangement undesired knowledge of the nature of the stimulus or other matter of technique was avoided.

Records were taken of the character of the breathing, of the changes in pulse form and blood supply in the left forearm and of the alterations in muscle tension in the fingers of the right hand.

Upon the subject's breast was fastened a Marey tambour pneumograph, held in position by tapes passing over the shoulders and around the body under the arms. To the stem of its bulb was attached a rubber tube connecting with the chamber of a pneumatic registering pen, whose point traced the curve of respiration upon the surface of a horizontally revolving drum covered with smoked paper. During the later experiments a second pneumograph was added which recorded the character of the diaphragmatic respiration.

The features of the pulse and of blood distribution were recorded in one composite tracing given by an air plethysmograph. This consisted of a glass cylinder fifty centimeters long and ten in diameter, open at one end and at the other drawn to a neck, in which a cork, having a glass tube passing through

it, was tightly fitted. Around the open end of the cylinder was stretched a rubber band twelve centimeters wide, which was cemented to the glass and formed an air-tight bandage upon the subject's arm when inserted in the cylinder. This cylinder was suspended by cords from the ceiling at such a height that the subject's arm, when inserted in it, might be in an easy position as he sat in the chair. This long radius from the point of support gave great flexibility in yielding to slight motor reactions on the part of the subject, those which normally occurred in the course of the experiment—as observation proved—having no appreciable effect upon the character of the pulse and volume curve. When the arm, as far as the elbow, had been placed in the glass chamber, the plethysmograph was connected by means of a rubber tube attached to that passing through the cork in its neck, with a registering pen similar to that used in recording the respiration.

The muscles selected for observation were those of the index finger of the right hand, which, during the early experiments, was placed in the holder of a Delabarre muscle recorder, and afterwards in an adaptation of this instrument, by which the direct extensile and contractile changes without the lateral movements were recorded. The right forearm rested upon a stand drawn up beside the subject, the wrist being supported by a cushion, the hand turned laterally, and the index finger, slightly flexed and free from interference or support by the others, inserted as far as the first joint in the muscle recorder.

The giving of the signals and the application of and relief from the various stimuli were recorded by the momentary deflections of a registering pen operated by pressure upon a rubber bulb held in the hand of the conductor of the experiment. There were thus traced upon the one drum at the same time five curves, two registering the respiration, a third the pulse and blood distribution, the fourth the muscle changes, and the fifth the giving of signals and application of the stimuli. The five points of the registering pens were aligned upon the face of the cylinder with each other and with the time recorder, so that being under the control of the operator, there was possible an exact knowledge of the correspondence between the phases of

application, relief, etc., and the changes of the function recorders. The smoked paper records were subsequently fixed by dipping in an alcoholic solution of gum sandarac. The tracings were read with the aid of triangles and millimeter scales by reference to base lines parallel to the direction of rotation of the drum. Full notes were taken of each experiment, its conditions and the experience of the subject during its course.

Functional Changes during Perceptual Attention.

The subject sat in an easy position, with eyes closed and instruments adjusted. A period of thirty seconds was allowed to elapse during which he remained quiet, avoiding all movement and mental effort. At the close of this period a watch was opened and brought forwards to the subject's ear, until it was just possible for him, with considerable effort, to follow its ticking. To this faint, rhythmical sound his close voluntary attention was given during a second period of thirty seconds; and a third of similar length, in which the effects of relief and the return of functioning towards the normal type could be observed, closed the experiment. Silence was maintained through the three periods. At the close of each experiment the subject described his mental experiences, the degree, constancy, and mechanism of his attention, disturbances, and the like, so that the quality of the subjective condition represented by the record was known in each case. The following figures exhibit the character of the respiration during perceptual attention.

Average Length of the Respiratory Phases.

1. Normal.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.68 secs.	.33 secs.	1.08 secs.	1.51 secs.
B	.75 "	.47 "	1.41 "	1.16 "
C	1.35 "	1.08 "	2.59 "	2.55 "
D	1.21 "	.11 "	1.08 "	1.93 "
E	.77 "	.24 "	1.03 "	1.34 "
F	1.31 "	.27 "	2.07 "	1.71 "
G	.95 "	.32 "	1.31 "	1.14

	Total Respiration.	Depth.		Total Resp.	Depth.
A	3.59 secs.	14 mm.	E	3.38 secs.	17 mm.
B	3.81 "	11 "	F	5.35 "	24 "
C	7.45 "	36 "	G	3.62 "	27 "
D	4.34 "	40 "			

2. During Attention.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.83 secs.	.87 secs.	1.45 secs.	1.25 secs.
B	.73 "	.39 "	1.38 "	.93 "
C	1.12 "	.45 "	2.70 "	1.08 "
D	.74 "	.11 "	1.08 "	1.38 "
E	.69 "	.36 "	1.42 "	1.76 "
F	1.34 "	.22 "	2.02 "	2.09 "
G	.69 "	.57 "	.94 "	1.05 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	4.41 secs.	.19 mm.	E	4.27 secs.	.24 mm.
B	3.43 "	.15 "	F	5.58 "	.22 "
C	5.81 "	.13 "	G	3.28 "	.15 "
D	3.31 "	.28 "			

The characteristic changes accompanying attention to perceptual objects, as shown by these figures, are:

(1) A tendency to reduce the length of the inspiration. The respiration of sleep and of low mental activity in general has been found to be characterized by its long inspiration and short expiration. As the mental excitement rises the latter component increases, the former decreases. The same tendency appears here as attention succeeds inattention. In five subjects the decrease is an absolute one, sometimes of marked extent—*e. g.*, 1.21 to .74 secs.; in the remaining cases, (A) and (F), though the figures show an absolute increase, a comparison of the durations for the full respiration [3.59—4.41 secs.; 5.35—5.58 secs.] reveals the fact that there has been at the same time a relative decrease.

(2) There is a general increase in the relative length of the expiration. In four subjects this increase is also positive; in the fifth, in which an absolute decrease appears, there is at the same time a relative increase in length (1.41–3.81 secs.; 1.38–

3.43 secs). The sixth and seventh do not conform to this type. The time-relation of inspiration and expiration is characteristic of the state of mental activity. Respiration during sleep is marked by relatively slow inspiration and rapid expiration. In drowsiness and after a full meal the same predominance of the inspiration is noticeable. With the increase of cerebral excitement the inspiration grows rapid, direct and strong, the expiration slow and interrupted. The extreme forms are seen in the sudden inspiratory sob of weeping, followed by the prolonged expiration, broken by repeated suspensions of the breath; or in the similarly swift influx of air in laughter with its subsequent series of alternate suspensions and expulsions. Both the strong inspiration and the retardation of contraction during expiration point to an increased expenditure of energy as compared with the phenomena of sleep, where the innervation is sufficient only to inflate the lungs slowly, and where the contraction of the chest at its close is not interfered with by the contraction of the voluntary muscles.

(3) There is a general increase in the rapidity of the respiration. This is also a characteristic of heightened mental activity. The exceptions to it are noted under section (4).

(4) When the respiration decreases in rapidity the retardation is due not to a proportional increase in time of all the component phases, preserving the normal type, but to an abnormal suspension of the breath with the lungs inflated [A. .33—.87 secs.; E. .24—.36 secs.], to a prolongation of the expiration [A. 1.06—1.45 secs.; E. 1.03—1.42 secs.], or to an exaggeration of the respiratory pause [F 1.71—2.00 secs.], all of these indicating an inference with the regular periodic innervation of the organic muscles.

(5) There is a moderate tendency to superficiality of respiration. This is extremely marked in the case of three subjects. In three others it altogether fails to appear. Two of these are characterized also by slow respiration and retardation of the respiration.

(6) In general, the attitude of attention is characterized by disturbance of function. Every departure from the normal type is significant as indicative of an interference with the automatic

character of the respiration. The breathing during attention is marked by just such wide and frequent but irregular fluctuations. This will be made more apparent by the following table of the comparative variations in time and depth during the normal and experimental periods.

	Normal.		*Attention.*	
	Time.	Depth.	Time.	Depth.
A	1.01 secs.	13 min.	3.15 secs.	17 min.
B	.67 "	35 "	1.01 "	45 "
C	.45 "	6 "	.56 "	7 "
D	1.05 "	5 "	2.80 "	36 "
E	.82 "	9 "	2.68 "	25 "
F	.73 "	8 "	1.16 "	5 "
G	1.05 "	10 "	1.75 "	18 "

The changes in variability are more readily appreciable than those in average character. The variation in the length of individual respirations has increased to more than double the normal. This increase in variability is uniform; each individual record of every subject shows it. There is a similar increase in the extent of the variation in depth, amounting in extreme cases to seven times the normal, and failing to appear only in a single case, where the variations in normal and attention phases are as six to five.

Characteristics of the Pulse and Volume Curves.

As throughout the whole series of experiments the plethysmographic and sphygmographic records unite in one volumetric curve, an exact analysis of their separate character is frequently impossible, the change in strength of heart contraction and the secondary features of the pulse wave being obscured by simultaneous changes in the volume curve. A number of significant features, are, however, definitely determinable. There is, without exception, an immediate increase in the rapidity of the rhythm at the beginning of the attention period, succeeded by a more gradual and enduring decline. This slowing usually continues until a point below that of the preliminary period is reached, when there is again a gradual increase

towards the normal. The following table shows the extent and duration of the changes for the various subjects concerned. The figures give the averages for successive periods of twelve seconds each.

	Normal.		*Attention.*		
A	72.5 per minute.	72.5	per minute.	70.0	per minute.
A	87.0 " "	90.5	" "	80.0	" "
A	72.5 " "	77.5	" "	75.0	" "
A	80.0 " "	82.5	" "	80.0	" "
B	75.0 " "	82.5	" "	77.5	" "
C	62.5 " "	67.5	" "	65.0	" "
C	62.5 " "	65.0	" "	55.0	" "
D	95.0 " "	102.5	" "	92.5	" "

The maximum increase is reached within the first ten seconds in the case of all subjects; and the whole acceleration is usually confined to a period of twenty-five seconds. In some cases the decline is more gradual and reaches the normal only towards the close of the experiment. With the greater number the retardation is more rapid and passes beyond the normal, in some cases to a greater extent than the primary acceleration rose above it.

There is, in the case of most subjects, an increase in the interference of the respiratory period with the volume curve, which tends to obscure the character of the pulse-beats. So far as has been observed, the effect of attention upon the strength of heart contraction is variable. With three of the subjects there is a reduction in the extent of the stroke, independently of the variations in the volume curve or the respiratory changes. In subject D there is an increase, together with a marked irregularity, in extent, and in a similar inconstancy in the rhythm of successive beats. This perhaps marks, in one of D's temperament, the presence of a rather strong emotional element due to nervous excitement.

Simultaneously with the primary acceleration of the pulse occurs a rapid and extensive fall in volume, reaching a minimum at the end of a period varying from six to ten seconds, followed either by a gradual and more continuous rise towards

the normal line, or by a series of subsidiary waves, finally approximating to that which characterized the preliminary period. These wave-like and frequently rhythmical changes of volume find an apt interpretation in the hypothesis of fluctuation, each pulse of close and accentuated attention being followed by a period of distraction and relaxation; and the prevalent subsidence of the waves in the latter part of the experiment may indicate the gradual failing of attention through fatigue.

The effect of attention upon the interference of the respiratory period is variable and obscure. In some cases the rhythmical increase and diminution of volume is reinforced, even when the respiration grows more superficial; in others there is a reduction in the interference, especially if the breathing becomes more shallow. In others again no definable alteration in character appears.

Muscle Changes in Perceptual Attention.

These are typical and uniform. The changes consist, in general, of an exhibition of movement and tendency to relaxation of the muscles, indicating a lowering in the static tonicity of the muscular system. In the preliminary period the finger record is usually effected by the respiration, a slight extension of the arm accompanying each inspiratory elevation of the chest, and being followed by a corresponding contraction during expiration. These changes are uniformly reduced and frequently obliterated during the period of attention, though the respiration suffer no diminution in depth. The preliminary period is usually marked by a constant *subsultus tendinorum* as well as by more massive spasmodic contractions and expansions of the muscles. These are reduced and frequently disappear during the attention period. The tendency to relaxation does not always appear as a positive extension of the finger. In some experiments the finger will be found to remain stationary during attention; in some others a continued or intermittent contraction is manifested. But in every such case there is a *relative* relaxation. Where the preliminary period shows a tendency to contract—if strong, it continues, but in reduced

degree,—if slight, it disappears or is replaced by moderate extension. Where the preliminary period shows no change, the passage to attention is marked by extension, slight in some cases, great in others; and where the first period is characterized by continuous extension it is immediately and strongly reinforced at the beginning of the experimental stage. These expansions and contractions during the earlier period are probably due to the fact of insufficient time having been allowed for the muscles to reach a state of equilibrium. But the effect of the passage to attention is seen as clearly in the altered direction of the curve as it is when the preliminary period is marked by rest.

A negative illustration of the muscular changes accompanying attention appears at the close of the period when the tremors, irregularity in contraction and expansion, respiratory influence, and general tendency to contraction again set in.

Functional Changes during Attention with a Strong Sensory Element.

In the preceding series the object of attention was a neutral one; there was nothing in the ticking of the watch which was *per se* interesting. The attention was wholly secondary and voluntary; the subject deliberately abstracted from all other objects and focused his attention upon this dull, monotonously-repeated sound.

There will evidently be a new element introduced into the mental complex if a stimulus be selected which besides the derived interest of voluntary attention, comes to the subject with a distinct of its own, one which by its unusual or pronounced sensory character arouses a certain emotional element and fixes the attention by its own power. Such a combination of voluntary and involuntary attention elements was sought by tracing upon the subject's cheek with the tip of a pencil a series of geometrical figures which the subject endeavored to discriminate and recognize by the sense of touch alone. The stimulus was novel; it involved a continuous sense stimulation apart from the volition of the subject; and with all the persons concerned

in the experiments it seized and held the passive attention as simple touch sensation, apart from the character of the lines drawn. There was required in addition a close and constant effort to recognize the various forms which were one after another inscribed upon the skin. These experiments were conducted with five subjects with the following results:

AVERAGE DURATION OF THE PHASES OF RESPIRATION.

1. Normal.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.76 secs.	.22 secs.	.58 secs.	1.22 secs.
B	1.27 "	.31 "	1.40 "	1.46 "
C	.56 "	.17 "	1.03 "	1.17 "
D	1.08 "	.27 "	.72 "	.72 "
E	.63 "	.22 "	.58 "	.58 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	2.78 secs.	25 mm.	D.—	2.79 secs.	25 mm.
B	4.45 "	37 "	E.—	2.01 "	20 "
C	2.93 "	25 "			

2. During Attention.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.49 secs.	.36 secs.	.85 secs.	1.11 secs.
B	1.14 "	.36 "	1.48 "	1.90 "
C	.47 "	.56 "	1.34 "	.83 "
D	.94 "	.18 "	.94 "	.85 "
E	.49 "	.54 "	1.39 "	1.12 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	2.81 secs.	13 mm.	D.—	3.91 secs.	20 mm.
B	4.91 "	30 "	E.—	2.50 "	20 "
C	3.16 "	13 ,,			

The comparative changes here are of the same type as those which were found to characterize the passage from rest to purely voluntary attention; but they are more constant and of greater extent.

There is first a reduction in the relative length of the inspiration, and an increase in that of the expiration. But in both

these components the change is more invariable than in the preceding series and of greater extent. In the present form of attention it is throughout positive as well as relative; the extent of the reduction, also, is greater in the present series than in the earlier one. In the case of the expiration, again, there is a more constant increase in duration, every subject showing both a relative and a positive increase, and this increase is of greater extent than in voluntary attention.

There is in every case a decrease in the rapidity of the rhythm. In all cases but one—E. 2.01–3.50—this increase is relatively slight. Voluntary attention, on the other hand, was characterized by an increase in the rapidity of the respiration.

The changes in the respiratory pauses are variable; in some objects the averages show an increase, in others a decrease appears. These figures are among the least significant of the record. What characterizes the curves of this composite attention is essentially departure from type, disturbance of function, which a system of averages may as readily tend to obliterate as to preserve. This feature of the breathing during attention appears more plainly by a comparison of the extent of the variations in respiration during the contrasted periods.

	Normal.		*Attention.*	
	Time.	Depth.	Time.	Depth.
A	1.10 secs.	10 mm.	3.40 secs.	22 mm.
B	.62 "	4 "	2.92 "	20 "
C	.45 "	2 "	.57 "	6 "
D	.22 "	3 "	.45 "	4 "
E	.45 "	4 "	2.90 "	9 "

The increase of variation both in the rapidity of the rhythm and in the extent of inflation of the period of attention over that of the preliminary period is evident. These fluctuations will also be found greater than those which accompanied voluntary attention. There is at the same time a uniform reduction of considerable extent in the depth of the breathing. The same general tendency is present also in the previous form of attention, but is found lacking with three of the subjects.

Pulse and Volume Changes.

Few changes in the character of the pulse are to be observed in these records. The apparent strength of stroke remains unaltered during the two periods. Slight irregularities in the interval between successive strokes appear in one or two instances, and with one subject there is a slight reduction in the strength of the stroke. In the rate of the pulse beats, before and after the beginning of the experiment, and at successive periods during its continuance, a new set of changes is met with varying from the normal of the preliminary period in a direction opposite to those which appeared in the previous series. With all the subjects who took part, the tracing of the figures upon the cheek is accompanied by a retardation in the rate of the pulse, usually immediate, but in some instances delayed for several seconds, followed by an increase again towards the normal. In some cases the diminishing retardation continued throughout the period of stimulation; in others an acceleration beyond the rate of the preliminary stage was reached; in one record a secondary wave of retardation appears. These changes are independent of the fluctuations which occur in the volume curve. They are altogether unexpected; the addition of the sensory stimulus, bringing with it a certain emotional tinge, might lead one to expect an increase of the acceleration which was found in the previous series instead of the retardation which actually obtains.

Muscle Changes.

The same muscle changes appear here which characterize the earlier form of attention. In all six subjects there is an alteration in the direction of the curve at the beginning of the attention period. These changes do not always present a positive relaxation of the hand. In those instances in which a gradual contraction continues throughout the previous period, the new direction appears as a diminution in the rate of contraction. When the contraction is slight the subsequent curve shows either a state of equilibrium, or a faint expansion. When a previous tendency to expansion exists it is appreciably reinforced from the beginning of the new attitude onward.

There is, also, in the preceding experiments a tendency to inhibition of movements manifested in the absence of slight irregularities in the curve, and the dampening of the *subsultus tendinorum*. The respiratory period is less marked during attention than in the preliminary period, occasionally disappearing. These muscle changes are not invariably present, and different records fail to show any change of condition in the passage from inattention to stimulated attention.

Functional Changes during Recall of Past Events.

The preceding experiments were concerned with objects of perceptual attention; the present and succeeding sections abstract from objects of sense, and have to do with reflection and more purely intellectual processes.

The method of conducting the experiments was simple. The subject sat as before with closed eyes, the instruments adjusted upon his body. After a preliminary period of inactivity, he was required to recall various groups of objects, such as the instruments which he had seen in a certain case, the substance of a late lecture, the experiences of a particular day in the past, and the like. At the close a final period of rest was given; and at the end of each experiment the observer made full notes of his subjective experiences.

In recall the changes in the character of the respiration are of the same general type as those found present in perceptual attention, but are more variable in direction, of slightly less extent, and present more individual variations. The quantitative relation of the phases is shown in the following tables:

1. Normal.

	Inspiration.	Insp. Pause.	Expiration.	Ex. Pause.
A	.76 secs.	.22 secs.	1.37 secs.	1.35 secs.
B	.72 "	.67 "	1.57 "	1.30 "
C	.76 "	.36 "	1.37 "	.90 "
D	1.12 "	.36 "	1.17 "	.40 "
E	1.26 "	.76 "	2.92 "	.63 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	3.70 secs.	29 mm.	D.—	3.05 secs.	52 mm.
B	4.26 "	23 "	E.—	5.57 "	37 "
C	3.39 "	30 "			

2. Recall.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.49 secs.	.27 secs.	1.08 secs.	1.03 sec.
B	.54 "	.18 "	1.80 "	.81 "
C	.30 "	.54 "	1.03 "	1.35 "
D	.63 "	.40 "	1.26 "	.54 "
E	.94 "	.63 "	1.71 "	.63 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	2.87 secs.	22 mm.	D	2.83 secs.	37 mm.
B	3.33 "	32 "	E	3.91 "	24 "
C	3.23 "	13 "			

Variations in Respiration.

	Normal.		*Recall.*	
	Time.	Depth.	Time.	Depth.
A	.45 secs.	6 mm.	.90 secs.	19 mm.
B	1.35 "	4 "	.45 "	9 "
C	.45 "	4 "	.70 "	9 "
D	.90 "	10 "	.22 "	6 "
E	1.35 "	4 "	.70 "	9 "

The general increase in irregularity of depth is evident here. The extent of this increase is magnified when it is remembered that there is at the same time a reduction in the average depth of respiration. It is probable that this irregularity is chiefly a physiologically originated phenomenon. The rapid superficial breathing which accompanies continued effort to recall, affords insufficient aëration of the blood; the series is broken in upon here and there by one or two fuller respirations stimulated by incipient asphyxiation. In some cases, however, an irregularity appears which is more closely related to the consciousness aspect of the experience.

The simple effort involved in all recall is expressed in the quickened shallow breathing, which increases in rapidity and superficiality with the difficulty involved in the process. The change here is rather in the direction of increased uniformity than of variation from it. When the objects of recall are not neutral, such as remembering a series of numbers or the instruments in a certain case, but are colored with a strong emo-

tional element; wide irregularities in the character of the individual respiration are presented, similar to those which appear under strong sensory stimuli. The subject is, in a less intense degree, living over again the experiences which he is endeavoring to recall, and the disturbance of function which accompanied their original occurrence is partially reëstablished here.

There are therefore two elements in recall to be kept separate, as affecting the character of the bodily functions: (1) the effect of attention, the simple intellectual effort requisite to the recall of indifferent objects; (2) the effect of personal relation to the objects of recall.

The character of the functional change varies from individual to individual. In some cases, instead of the superficial respiration which characterizes most subjects, there is found a rapid, regular but more profound respiration than in the normal. With other subjects there is a great reduction in depth, the breathing at times being almost suspended.

While the degree of functional disturbance varies from subject to subject, within the individual record the variation increases with the effort requisite for recall. A sense of ease and freedom is accompanied by slight variation from the normal; with increasing difficulty the deflection of the curves becomes greater and greater. This is seen most clearly in those cases in which the emotional element is got rid of, and the changes are wholly due to the intellectual effort involved. This condition is approximated to in the following series, in which the subject was required to perform certain arithmetical calculations of varying complexity.

At present we may say that the effort to recall a series of past events is accompanied by a rapid superficial breathing, marked by a swift short inspiration and an interrupted and prolonged expiration; that with the decrease in depth there is a greater irregularity in the duration of successive respirations, in the depth of the breathing, and in the time relations of the component phases of the individual respirations; and that as the process of recall becomes more difficult and involves greater effort the extent of the variation from the normal increases.

Also, that while simple recall of indifferent objects is ac-

companied by a quick slight breathing which may be more uniform than the normal, the recall of things which involve a strong emotional element is characterized by irregularity of rate, depth and form, the nature and extent of the irregularities depending upon the emotional character of the objects recalled. The average rapidity of the respiration is likewise without exception increased; and there is an absence of the suspensions with full or deflated lungs, or in the midst of expiration, which frequently characterized the former mental attitude.

Characteristics of the Pulse and Volume Curves.

The type of change here seems to vary. The pulse-beat is in some cases at first increased, then slowly reduced to the normal towards the close of the experiment. With others there is an immediate slowing of the pulse rate gradually accelerating towards the normal again. These two types of change are present in the same individual at different times. In all cases in which an immediate increase in rate appears the process of recall was attended with difficulty. In those marked by a fall it was either easy or no mention was made of effort. The pulse rate frequently presents the form of a series of waves, alternately rising above and falling below the normal of the preliminary period. It is possible that these may indicate a series of fluctuations in the intensity of the attention and of the effort to recall.

In almost all cases the pulse stroke is shortened during recall. Frequently this change is immediate and definite, in some cases the reduction amounting to one-third or even one-half of the previous extent of stroke. There is usually with this a simultaneous reduction in the depth of the breathing, which, as a purely physiological phenomenon, is accompanied by such a reduction in the pulse stroke, but the change under these conditions is concomitant with a rapid rise in volume, and the reduction in pulse stroke is proportional to the extent of the volume increase. In the case of recall, however, the reduction is accompanied by a decrease in arterial tension, marked by a fall more or less rapid and extensive in the volume curve. It also

occurs when the respiration is increased in depth instead of becoming more superficial.

The form of the pulse wave also undergoes alteration. The preliminary period is characterized by a full strong stroke, followed by an immediate and sharp fall towards the dicrotic crest, making an acute apex; in the period of recall the shorter stroke is succeeded by a slow delayed subsidence, the tracer dragging on towards the next stroke before a decided fall takes place giving a blunted form to the arterial wave.

The volume curve shows less tendency to typical forms of change than in the previous experiments. There is usually an immediate fall in volume at the beginning of the period, continuing from five to ten seconds, and followed by a more gradual rise, the two phases being repeated several times during the course of the period, usually with a decrease in the width of the variation towards the end.

These wide fluctuations in the volume curve during recall are the most constant factors which appear. Since the transition from the previous diffused mental state to the concentration of attention in recall is typically marked by a fall of greater or less extent in the arm volume, the occurrence of these repeated waves suggests a fluctuation in the degree of effort made, the attention coming and going in pulses.

The interference of the respiratory period increases during recall. In normal cases its influence increases and diminishes with the depth of the respiration; suspension of the breath causes it to disappear. Here, on the contrary, it grows more pronounced even when the breathing simultaneously grows more superficial.

As relief there is a slowing of the respiratory rhythm, an increase in the depth of the breathing and of the duration of the inspiration with a relative reduction in that of the expiration, an increase in the extent of the pulse stroke, a slowing of the pulse rhythm and a rise in the volume of the arm.

Muscle Changes during Recall.

The changes here are similar to those found present in the earlier series on perceptual attention. The transition from the

preliminary effortless state to that of strenuous recall is marked by a change in the direction of the muscle curve. This is manifested as before in a reduction in the degree of contraction, a disappearance of it, or a substitution of expansion, in cases in which a contraction appears in the preliminary period, and a reinforcement of the tendency of expansion where such already existed. This change in the direction of the curve is very uniform. There is also a reduction in the greater irregularities which usually characterize the normal curve, and a disappearance or dampening of the *subsultus tendinorum*. The essential features of this curve, then, are a tendency to a relaxed condition of the muscles, and an absence of muscular excitement, marked by a quiet even curve without massive changes or tremors.

Functional Changes during Calculation.

The method of experimentation here is varied only by the substitution of a new form of stimulation. The subject was required to perform certain arithmetical calculations instead of recalling a series of past events. We may therefore proceed immediately to a consideration of the particular changes in function which present themselves.

1. Normal.

	Inspiration	Insp. Pause.	Expiration.	Exp. Pause.
A	.72 secs.	.22 secs.	1.39 secs.	1.35 secs.
B	.76 "	.31 "	1.24 "	1.12 "
C	.67 "	.40 "	1.17 "	1.35 "
D	1.26 "	... "	1.89 "	1.98 "
E	.67 "	.49 "	.85 "	1.11 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	3.68 secs.	29 mm.	D.—	5.13 secs.	81 mm.
B	3.43 "	34 "	E.—	3.12 "	15 "
C	3.59 "	20 "			

2. Calculation.

	Inspiration.	Insp. Pause.	Expiration.	Exp. Pause.
A	.49 secs.	.22 secs.	1.12 secs.	.90 secs.
B	.22 "	.31 "	1.12 "	.36 "
C	.67 "	.22 "	1.26 "	.37 "
D	.58 "	.13 "	1.62 "	1.89 "
E	.45 "	.45 "	.85 "	.85 "

	Total Resp.	Depth.		Total Resp.	Depth.
A	2.63 secs.	22 mm.	D.—	4.22 secs.	61 mm.
B	2.01 "	13 "	E.—	2.60 "	12 "
C	2.51 "	25 "			

There appears here, as in the previous experiments, an increase in the rapidity of the respiratory rhythm; but while in both series there is a reduction in the rate of the respiration, in the former the relation of the component phases was significantly altered, while here there is little variation from the tpye of normal unstimulated respiration. In one component, however, there is a great change, the respiratory pause is invariably shortened, usually to a great extent. In normal breathing it is frequently accentuated, the expiration being followed by a distinct period of quiescence before the succeeding inspiration. During calculation this pause is either lessened or altogether disappears; inspiration follows expiration with scarcely a break. This feature is significant. Exaggerated pauses are characteristic of one attitude of mind, diminished pauses of a typically different state. In any sudden surprise the breath remains suspended, inhibited sometimes for several moments, till the shock passes by. The same suspension appears in more exaggerated forms in fear and terror. In close attention—in the effort to catch a faint sound, for example—it is also a characteristic feature. These states of mind are marked by a general inhibition of function which extends to temporary cessation of the respiratory process, until the oppression of the lungs finds relief in renewed respiration. In all work—expenditure of effort—on the other hand, there is an increase of functional activity. The heart beats faster and stronger, the respiration grows deeper and more rapid, and the glandular secretions of the skin become more copious during muscular exertion. And the same change, in greater or less degree, accompanies increased intellectual activity. In exciting emotions the respiration is deep and rapid with lungs inflated, inspiration and expiration succeeding each other without pause.

In more purely intellectual activity, the breathing, which is usually more superficial as well as more rapid, is marked by an

almost complete obliteration of the respiratory pause. This rapid, equable and slightly superficial respiration may be conducive to a more constant supply of blood to the brain, the sudden and great expansion of the lungs in deep respiration causing too great a fluctuation in the quantity supplied to its vascular tissues for continuous cerebral activity.

The uniformity of respiration during calculation will further appear from the following table of variations during the two periods:

	Normal.		*Calculation.*	
	Time.	Depth.	Time.	Depth.
A	.22 secs.	4 mm.	.66 secs.	19 mm.
B	1.10 "	17 "	.90 "	20 "
C	.70 "	7 "	.22 "	5 "
D	1.10 "	12 "	.70 "	30 "
E	.90 "	4 "	.70 "	6 "

The variation in depth is usually greater in the more highly stimulated conditions. This is probably due to two different causes. These are, first, the physiological one of periodically increased innervation from incipient asphyxiation, the more superficial respiration being insufficient for the needs of the system; and, second, the psychological one of fluctuation in the intensity of the effort required in calculation periods of close attention with rapid, regular, superficial respiration alternating with periods of relaxation indicated by the fuller breathing of relief. In some cases no such rhythmical series appears, the respiration growing continually more superficial as the calculation proceeds. This may indicate a continued attention with increasing effect, as both the shallowness of breathing and diminution of volume are found to bear close relation to the difficulty of reckoning involved in the problems given.

Pulse Volume Curves.

The beginning of calculation is in all cases accompanied by an acceleration of the pulse rate, sometimes of great extent, and continuing throughout the larger part of the period. The form of this acceleration varies greatly from individual to individual and from record to record.

The rise is sometimes immediate and rapid, succeeded either by a similarly sudden fall or by a sustained increase in rate. Sometimes the acceleration is slow, maintained during a considerable period, and falling again gradually towards the normal. In some cases the rise is developed for several seconds after calculation begins. The return to the normal is usually reached within a minute's calculation. In some cases the acceleration dies away before one-half the time of calculation has expired. At relief a fall below the normal appears with occasionally a secondary wave of acceleration. The following figures give the average rate before calculation and for successive periods of twelve seconds during calculation:

	Preliminary Period.	During Calculation.		
A	62.5 seconds.	67.5;	80.0;	85.0 secs.
B	72.5 "	72.5;	74.5;	75.0 "
C	77.5 "	77.5;	82.5;	85.0 "
"	75.0 "	82.5;	75.0;	—— "
D	57.5 "	65.0;	62.5;	62.5 "
"	65.5 "	70.0;	75.0;	75.0 "
E	60.0 "	65.0;	67.5;	65.0 "
"	75.0 "	77.5;	80.0;	75.0 "
F	50.0 "	55.0;	60.0;	60.0 "

An almost constant feature of the pulse during calculation is the reduction in height of stroke. This may be due either to a weaker ventricular contraction or to an increase in the arterial tension. The latter condition accompanies any voluntary reduction in depth or complete suspension of the respiration. The volumetric curve shows an immediate increase in curve volume, due to congestion of the blood in the smaller veins and arteries, and a reduction in the height of pulse wave—which may finally become obliterated—due to the continued increase in arterial tension. If then the respiration uniformly becomes more superficial during calculation, such a reduction of the pulse wave is to be expected; it becomes a secondary phenomenon, and, except as depending upon the primary change in respiration, is relatively insignificant.

But in these records it appears independently of the respira-

tory changes, occurring when the respiration is increased in depth as well as when there is no appreciable variation in it. Compare it again with the concomitant changes in the volume curve. This is found to alter as the character of the respiration changes, and as the volume changes the form of the pulse also undergoes alteration. But the changes which appear during calculation seem to be independent of the changes in the volume curve as well. A reduction in the height of the pulse wave is the physiological concomitant of increased arterial distension; but here it occurs simultaneously with its fall in arm-volume which normally marks the increased mental activity during calculation. It is present when there is no appreciable change in arm-volume, and it persists both in the rising and falling of the curve. The reduction of the pulse wave, therefore, since it appears even with increased respiration and a falling volume curve, both of which should tend to reinforce it, is a direct effect of the central change obtaining during calculation.

The volume changes are analogous to those of the preceding series. Decrease is more or less rapid and extensive, continuing for a variable period, and followed either by a continuous, gradual rise, or by a series of wave-like fluctuations in volume.

Muscle Curve.

The changes in the muscle curve are usually of slight extent and identical in type with those described in the preceding experiments upon recall. They are not invariable in direction nor so constant as in recall and perceptual attention. Occasionally there is an increase in the tremor of the muscles, occasionally also a greater irregularity in the form of the curve during calculation than in the preliminary period; and in one or two instances a slight tendency to contraction appears, or a previously existing contraction is reinforced.

In general, however, these changes are the same as in those of recall. Contraction and muscle tension are replaced by relaxation and extension of the fingers. This is shown also in the contraction which frequently appears again at the close of the period, the static muscle tension recovering its normal tone

as soon as attention is drawn from the process of calculation. With this relaxation goes a diminution of muscular tremor and a reduction in the irregularities of the curve. This relaxed condition during close mental effort indicates a reduction in the degree of reflex stimulation throughout the organism, and inferentially a greater efficiency to the central nervous discharges. Tension represents expenditure of energy; there is a continual drainage of nervous force to the peripheral system when this is in a state of activity, and the lowering of this expenditure—which characterizes the types of activity here investigated—leaves free a wider margin of available energy for the central activity.

DISCUSSION AND REPORTS.

THE METAPHYSICAL METHOD IN ETHICS.[1]

In his preface Mr. D'Arcy defines his essential point of view and aim. It is to give *briefly* 'an account as well of the metaphysical basis as of the ethical superstructure' of conduct. Referring to Mr. Muirhead's Elements, Mr. Mackenzie's Manual, and my own Outlines of Ethics, he says of them that their ethical contents is much the same as that of his own work, 'but all three build without a foundation.' This foundation he takes to be Green's method and main results as reached in his Prolegomena to Ethics,[2] and he proposes to do in small space what Green did in a more extended way.

It should also be noted that Mr. D'Arcy declares his inability "to accept in its entirety the Hegelian[3] conception of the spiritual principle as presented" by Green. And as matter of fact, Mr. D'Arcy accepts the doctrine of Green only up to a certain point, and then supplements it by quite other considerations, derived, as a rule, from the real or supposed needs of man's religious consciousness, and sometimes from 'common sense.'

It is this effort, then, of Mr. D'Arcy to give the metaphysical

[1] *A short Study of Ethics.* D' Arcy. London and New York, Macmillan & Co., 1895–6.

[2] As silence is supposed to give consent, it may not be impertinent for me to say that while I have always recognized my own great indebtedness to Green, yet his metaphysical method seems to me far from affording any adequate basis for ethical doctrine; on the contrary, all the serious weaknesses in Green's specifically ethical discussions seem to me to flow from his metaphysical assumptions.

[3] Mr. D'Arcy seems to accept *in toto*, as does Professor James Seth, Professor Andrew Seth's identification of Green's doctrine with Hegel's. I never have been able to see any basis for this identification. Hegel protests continuously and consistently against the Kanto-Fichtean ethics, and Green's standpoint is essentially the latter. The logic of the identification of Hegel and Green seems to be: Each is 'unsound' as to the relation of the human and divine self, and, therefore, both teach the same doctrine.

foundations of ethical theory, which, affording the distinctive feature of his book, calls for especial attention.

The primary condition of all experience is the relation of the subject and object. The subject eludes our grasp, when approached by itself. The not-self or object is divided into an inner and an outer region, the former including sensations, emotions, thoughts, etc.; the latter contains all the things we know in the world around us. The inner experiences, of course, presuppose the thinking subject. The following course of reasoning shows that the outer region is also dependent. Every *thing* is constituted by relations. The world of things in space and time is simply a vast complex of relations. But it is 'of the very nature of a relation to have no existence, no meaning, except for a thinker.' A relation is a "unifying of the manifold, and is, therefore, an impossibility apart from a subject, which can pass from one member of the relation to the other, and combine both in a single apprehension." Hence "things exist only so far as they are due to the synthetic activity of the knowing subject." Morever, since the thing is always constituted by relations to everything else in the universe, it is really a 'cosmic object,' so that the self is the unifying principle in the whole cosmos of experience.

The self is thus a unifying principle, and it is also the ultimate principle of unity. It is not simply the correlative of object, for it can make itself its own object, being self-conscious. It is a real unit, not a logical principle of a unity.

So far the language and the method remind us of Green, although Green, I think, would hesitate at this extraordinary identification of the self with subject apart from object, and at the ruling out from the self of all sensations, emotions and thoughts. As the method is nominally derived from the Kantian, it is perhaps worth while to note that Kant urged not only the necessity of the synthetic activity of the subject, but equally urged that the subject could be conscious of itself and of its unity only through its synthetic activity upon the manifold. But Mr. D'Arcy knows a better way than that. This theory might lead to the doctrine of the correlativity of the subject and the cosmos of experience—which appears to be an objectionable doctrine, leading to Pantheism — and consequently having affirmed the synthetic activity of the self in the constitution of the objective world, Mr. D'Arcy affirms that since it is self-conscious, it can also abstract itself wholly from the world which it constitutes. As Mr. D'Arcy simply affirms this as given in the fact of self-consciousness, wholly apart from any examination of the na-

ture or method of self-consciousness, I can only affirm from my standpoint that this way of giving 'foundations' for ethics seems to require more foundations for itself than it suceeeds in supplying.

Were the doctrine of the correlativity of subject and world affirmed, the self would obviously secure a certain universality; it would not be a merely particular self, if its essential being were found in the constituting of an objective world. But since Mr. D'Arcy holds that the subject exists in essential distinction from this constitutive work, and engages in it as it were only as by play, or as supererogation, the problem comes up: What sort of existence does the constituted world have? Is the universe a private possession of my own? Are we not committed to the doctrine of subjective idealism? Mr. D'Arcy implies, this would be the result if it were intended "to identify the cosmos of the individual experience with Nature. Nature must be accepted as a great fact, a mighty universe." Having thus secured from the simple 'common sense' affirmation (see p. 18) a world independent of the subject's consciousness, Mr. D'Arcy has also obtained a basis for the affirmation of an eternal self, free from all the pantheistic leanings of Green's doctrine. Since *our* world of natural things depends upon *our* synthetic activity, then surely this big world of Nature depends upon *its* constituting spirit—God.

I am forced to stop once more in my exposition to raise the question: What founds these foundations? Upon Green's doctrine—no matter what objections may be brought upon other grounds—there is one self and universe. There is no question of subjective idealism, because the subject is defined by reference to the permanent and objective work of constituting a universe; the particular individual knowing is a process of reproducing the eternal constitutive action. But this seems to Mr. D'Arcy pantheistic, and for reasons which he has not explained to the reader (save as indicated in deference to the opinions of Professor Seth and Mr. Balfour) pantheistic implications are to be avoided at all hazards, including those of logic. Hence this sudden break into a cosmos of my experience, and another bigger cosmos, with two spirits, the individual for my cosmos, God for the big one. Two questions can hardly be kept back. If we accept, because we cannot help believing it, the existence of this larger cosmos, it must also be remarked that common sense equally denies the dependence of *our* cosmos upon our subjective activity. Common sense is not particularly alarmed about the existence of the sun, moon and stars in the big cosmos, but objects with great vigor to

making the sun, moon and stars which are individually known dependent upon our individual thinking power. I doubt very much if Mr. D'Arcy can satisfy the realist by handing over to him a world, however big, which is unknown, while allowing the subjective idealist complete proprietary rights in the cosmos of individual experience.

But it may be said this is quite unfair to Mr. D'Arcy. Does he not say that the "cosmos of experience must be recognized as identical with a part of the great cosmos of Nature?" This brings me to my second question: Why then is not the individual self-identical with God so far as the identity of worlds goes? How, indeed, do we know there is a bigger unknown world, save as a projection, an extension, out of our present experience? Is it our 'own' self,[1] or is it the absolute spirit which really constitutes our cosmos? If the former, how shall we account for its coincidence with the cosmos of the absolute subject, and for the continuity between the two, as the individual cosmos extends itself? How shall we account for this remarkable capacity on the part of a uniquely individual self to construct a world having its own objectivity and relative permanence? But if the latter, then the whole theory of the ultimate and irreducible distinction of the two selves breaks down.

This same method, viz: the following of the Kantian analysis of knowledge up to a certain point and then the contradiction of its logical conclusion in the interests of religion and common sense—appears in the discussion of volition and of the common good. Will is treated as self-determination, and as indeed, only the more explicit recognition of the constitutive process found in all knowledge. "Every act of self-determination, every volition, is a determination, not simply of one thing, but of the whole cosmos of experience. Self-determination must be world-determination." This principle of determination recognized from the standpoint of the whole is freedom; while necessity is the principle of the articulation of the parts. They are thus correlative and imply each other, instead of being contradictory. That is to say, each fact or event taken as particular is necessitated; but that it is determined at all and determined in relation to other facts is due to an act of self-determination on the part of the subject. (P. 29; pp. 39 and 49 also.)

[1] Nothing could exceed Mr. D'Arcy's conviction of the 'ultimateness' of the individual self. "Self is for every man unique and ultimate. The identification of the self in every man with God involves the identification of all human selves. But since each self is for itself unique and ultimate, this identification amounts to a denial of the essential nature of selfhood." P. 46.

Why the self and the world should not be correlatives, while self determination and world-determination, freedom and necessity, are correlatives, Mr. D'Arcy does not explain. It is difficult to see why one principle should hold for thought and another for volition; or why, if one is objected to on the ground of pantheistic tendencies, the other is not equally 'dangerous.' The pressure to make self-determination and world-determination correlatives is obvious. Without this cor relativity, self-determination would occur in a purely transcendental, and, so far as we are concerned, empty region; will would have nothing to say or to do with the details of conduct. But the demand for correlativity on the side of knowledge is certainly none the less real altho' not quite as obvious. What the self-consciousness is which is found neither in consciousness of objects, nor yet in sensations, thoughts or emotions, Mr. D'Arcy does not explain, and we have only his word for it that it is not formal and empty.

The contradiction is still more glaring when we deal with the question of the End or Good. Mr. D'Arcy having settled that the subject is purely individual—for it must not get too closely implicated with the divine self for fear of pantheism—is quite consistent in holding that the end of self is egoistic. "Will is by nature egoistic. . . . . No other individual can stand on a level with the self. . . . . Reason is essentially anti-social. . . . . Self, unless mastered by some superior principle, must wage unceasing war against all who would pretend to equal authority." (Pp. 58, 59; the same doctrine also on p. 124 and p. 147.) Hence every moral system independent of religious ideas breaks down. It cannot explain why a man should love his neighbor as himself; it cannot justify the idea of a common good.[1] On the same line of thought, Mr. D'Arcy questions whether society is really an organic whole, since the individual is so very individual, and refers to it as an 'amorphous mass of tissue' (p. 73).[2]

[1] Mr. D'Arcy seems a little hard on the individual self. In the first place, it must be purely individual and unique, since otherwise it will get mixed up in a most pantheistic fashion with God and other selves. On religious grounds, in other words, it is quite shut up in itself. Then the interests of religion being duly secured, the self is gravely rebuked for its self-centred and self-seeking nature, and assured to be greatly in need of the assistance of religion to give it an end common with that of others. It is a little hard, I repeat, to refuse and to demand at the same time participation with other selves to the individual self, and both in the name of religion.

[2] Mr. D'Arcy nevertheless holds that there is no other idea save that of organic unity, which can be applied to society, and yet that the truth is not fully represented in that idea (p. 74).

But on the other side, religion is going to help out the egoistic nature of the self. We cannot stop short, after all, with the unity of the self. In this case "God himself would be simply one unit in a multitude and isolated from his creatures. But it is impossible to end in a disconnected multitude." The mind is forced to suppose some principle of unity deeper than the unity of self-consciousness. There is in God a transcendent principle by which he forms the ultimate bond of union among the multitude of persons. The fact of the union of spirits must be assumed as the ultimate basis of all coherence, speculative and practical. (Pp. 47–8.) Hence the common good for all persons. "All persons are naturally exclusive (*i. e.*, they limit one another), yet are they one in God. Hence the good for the whole is the good for every separate member. The true good for every man is a common good and an absolute good." (P. 102, see also p. 124.) Man and God have a common end. The end of conduct is identified with the end of the universe (p. 126).

We have precisely the contradiction here between the isolated, egoistic end of the self, and the common end of the self through its transcendental union with others in God that we met before as regards the constitutive action of self in *our* cosmos, and of God in *the* cosmos, except that here it is most explicitly recognized that We must not exclude the working of the divine end from the constitution of the human end. Mr. D'Arcy might, indeed, attempt to bridge the gulf by holding that the natural self is wholly given to evil; and that only by supernatural grace, initiated wholly from without, does the natural self come to such social ends; but there are no traces of any such doctrine in him. He seems to hold that in the moral life as such there is the immanence of the common end through the union of all selves in God. Were it not that the contradiction obviously escaped Mr. D'Arcy himself, I should think it wholly unnecessary to point it out. As it is, I must be pardoned for saying that if there is one self, named the divine self, in which all selves are united in a common end which is also the goal of the evolution of the universe, then the doctrine regarding the isolated, exclusive character of each individual self must be radically modified. It certainly is not legitimate to insist on the purely individual character of the self from one point of view; and then, when different considerations are in view, insist upon the community of selves. That the two ends of the contradiction are both set up in the name of religion does not make it any the less a contradiction; although it may make one suspicious of the particular type of religion represented.

Thus far the tendency of our examination has been to make us question whether Mr. D'Arcy's metaphysical foundations do not of themselves require more grounding than any ordinary ethical theory is likely to call for. I shall take space for just one application of his metaphysical to his ethical doctrine, seen in the question of the end, with a view to determining whether the ethical superstructure stands any the more firmly for the foundation put under it.

The ultimate end is the idea of a social universe in which every person's capabilities shall receive their full realization, and in which every person's realization shall contribute to every other person's realization. It is impossible, however, to give any further definition of the ultimate end, because it is impossible to know what are the possibilities of selfhood (pp. 104–5). Whence it is a fair inference that the end though not formal in itself is purely formal for us. "It must be granted at once that the Ideal End, or Ultimate Good, is relative to a set of circumstances at present non-existent[1] (p. 107)."

Mr. D'Arcy then goes on to deal with the proximate end, this ultimate end being obviously useless for the immediate guidance of conduct. 'Every collocation of circumstances has its best.' 'The good is perfectly individualized.' 'It is no rigid standard.' 'Its unit is the concrete act.' (Pp. 108, 112 *Passim.*) In other words, the real end is always the content of some special act, performed with its own space and time considerations involved in it. This strikes me personally as excellent ethical doctrine; but what demand is there then for the ultimate goal furnished by metaphysics? How does that give foundation in any sense for the concrete ideals with which man is actually concerned? Mr. D'Arcy gives two answers, or two perhaps reducible to one: the thought of the far away goal helps us to read the special instance; and we judge by the *tendency* of the proximate to realize the ultimate end.

As to the first answer, it is of great advantage to the individual to be aware of what he is really about in a special case, and any principle, however formal and abstract, which aids him in doing this is justified thereby. But it is not the *remote* goal, but simply a larger view of the *present*, which thus helps one. It is the reference of an act to the present society which it maintains or furthers that helps one

[1] To which Mr. D'Arcy adds, "But this is a defect attaching to every ideal"—yes, to every ideal metaphysically established, but to *no* ideal psychologically, or socially, determined, because in the latter case the ideal always is a certain set of present circumstances viewed in certain new relations and therefore no more requiring reference to some ultimate goal of the universe as a whole than does a scientific discovery or an industrial invention.

see its true content; not its reference to a society distant an infinite length of time. So far is the conception of a perfectly realized community at the extreme goal of progress from helping us read the present that, on the contrary, we can only read, or put any meaning into, that conception by reference to the present. As to the other answer, that the present may be conceived as means, it simply removes all value from the present. If the present exists simply as one stage in bringing about an infinitely remote goal, it presents no imperative claims and affords no ends. Such a doctrine simply denies the doctrine that every collocation of circumstances has its *own* best. It makes rainbow chasing the essence of the doctrine of moral ideas. For my own part, I believe that an ethical doctrine with less 'foundations' under it is likely to go farther and last longer.

In discussing Mr. D'Arcy's book from this one standpoint of the relation of his metaphysical to his ethical theory, great injustice would be done Mr. D'Arcy if I failed to recognize his own acuteness, subtlety and frequent suggestiveness. No one can read the book without stimulation. Mr. D'Arcy's personal attitude and method as distinct from that of his philosophic position, is straightforward and ingenuous. But the use of religious presuppositions to direct philosophic doctrine, first this way, then that, seems to me essentially disingenuous. Let us either explicitly hold that philosophy has no distinct right to be, but is always a form of theological apologetics; or let us give it the same intellectual freedom that we now yield to mathematics and mechanics. Let us not, even unconsciously, give philosophy the appearance, without the substance, of an independent position. More specifically, the results of Mr. D'Arcy's investigations seem to me to give at least a negative support to the hypothesis that what ethical theory now needs is an adequate psychological and social method, not metaphysical one.

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INVESTIGATION OF CUTANEOUS SENSIBILITY.

In spite of the recent increase of our knowledge of that most general of our senses—cutaneous sensibility—the experiments hitherto made leave one difficulty only partially solved. This difficulty is, in the first instance, of a technical nature, but it occasions secondary

disadvantages which in experiment prove greater or lesser sources of error. It consists in the accurate determining of the pressure-value to be produced on the portion of the skin under investigation. The importance of this factor in the investigation of cutaneous sensibility needs no further comment, for it is well known that the increased pressure, consequent on the deeper penetration of the instrument used, causes a larger area of skin to be affected. The æsthesiometers hitherto invented for the determination of degrees of pressure have not quite overcome this difficulty, for though serving to determine the pressure-value on portions of the body in a horizontal position, their application becomes difficult or impossible as soon as parts not adapting themselves to this easy posture are to be investigated; and in any case the abnormal attitudes exercise a disturbing influence on the results of the experiment. I should like therefore to direct attention to a method of investigating cutaneous sensibility, which, originating in physiological research, may become of importance in psychology. Prof. von Frey, of Leipzig, has described this method in *Berichte der mathemathisch-physischen Classe der Königl. Sächsischen Gesellschaft der Wissenschaften zu Leipzig* of July 2d, December 3d, 1894, and March 4th, 1895. It was a happy thought of the author to make use of the maximum stimulus-value of a hair of a certain length, this value being determined by the weight which the hair in curving just lifts on a pair of scales. For the different degrees of stimulation von Frey makes use of hairs of various sizes, bristles, horse-hair, beard-hair, women's hair, children's hair, cocoon-threads and glass-threads, also of similar hairs of different lengths. None of the stimulus hairs mentioned exceeds a length of 40 cm. Each single hair is stuck, by means of elastic glue, to a little wooden rod 8 cm. in length and perpendicular to its axis. The little rod serves as a handle during the experiments.

Having already written a detailed account of von Frey's interesting experiments for the *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, to which I refer the reader, I need here only mention that von Frey designates the maximum value of a stimulus hair measured by the scales as its 'force' (Kraft), that the 'pressure' (Druck) to be determined by the hair is obtained through the division of the primary value by the microscopically-measured transverse section of the hair and that, according to von Frey's investigations, sense-points differing in quality and in liminal value, are to be found on the surface of the skin. These, designated by von Frey as pressure and pain points, represent a different liminal value on the different parts of the skin.

Having frequently worked with von Frey, subsequent developments of the researches are known to me and I may, therefore, add that careful study of the deformation-phenomena produced by pressure has caused him, with respect to the pressure-points, to alter the above mentioned designation of the value reduced to unity. The pressure is no longer determined by the quotient $\frac{\text{force}}{\text{surface}}$ but by the quotient $\frac{\text{force}}{\text{radius of surface}}$. The progress made in consequence of these experiments of von Frey is, I think, not only in the proving of difference in quality and intensity of the various points of the skin, but also in the possibility of obtaining exact liminal values, and psychological science in its investigations must, I think, take all these factors into account. These thoughts have occupied me since my first acquaintance with von Frey's work, and the subject, it seems to me, is worthy of further discussion. How far we must take into consideration, however, in psychological questions, the relative values given by von Frey or those absolute values designated by him as 'force' will depend on the individual cases with which the investigation has to deal, and according as one is able in each individual case to preserve one or the other component constant. But it is clear that the simplicity of the method permits of the performance of exact quantitative measuring experiments on all parts of the body as soon as a series of stimulus hairs has been determined on the chemical scales. It is also clear that, taking this principle as a basis, it would be easy to construct a simple, satisfactory aesthesiometer. This idea, in the interest of my own science in the first place I communicated to Prof. von Frey, who, after having developed it, has had two sorts of æsthesiometers constructed by the mechanician Zimmermann, of Leipzig. These deserve further notice on account of their practical usefulness. One is more adapted for clinical purposes, and will doubtless be of great service in the investigation of pathological cases. It consists of a small tube of about 5 mm. in diameter and about 10 cm. in length, in which a metal rod, graduated in millimeters, may be moved up and down. The stimulus hair is fixed to the free end of this rod with elastic glue, as already mentioned. According as the rod, with affixed stimulus hair, is moved into the tube, the hair is shortened and its pressure value immediately altered, the latter, of course, increasing with the shortening of the hair. If the hair has been measured on the crater according to its different lengths, the pressure value may be read on the graduated rod, since the transverse section remains constant. The second æsthesiometer by von Frey is constructed on the principle of earlier instruments. It differs from these only in having yielding stimulus hairs accurately

gauged instead of hard points. Each hair is fastened into a capsule, which moves easily up and down a metal rod. The distance of the ends of the two stimulus hairs may thus be varied at will according to the experiment to be undertaken. The whole is fastened to a handle. It is needless to say that this instrument may be used with great ease in the investigation of every part of the body without necessitating any abnormal position, and I am not, I think, going too far in repeating that by von Frey's stimulus hair method former difficulties are surmounted.

The interest aroused of late in the investigation of skin sensation gives me hope that this short notice may direct attention to this method, the application of which will certainly not be fruitless. The arrangement of the stimulus hairs occasions some difficulty at first, but this is soon overcome by practice and more than compensated for by subsequent success. Von Frey's method has proven of great value in the treatment of diseases of the eye as also is other pathological cases.

I may add to the foregoing that when one wishes to mark certain skin-points for continued investigation 10 % nitrate of silver may be applied to the skin by means of a capillary tube the walls of which must not be too thin. Injury to the nervous end-organs can in this way scarcely be apprehended. This is as a rule von Frey's method of marking skin-points under examination. I often make use of a watery solution of methyloiolet which, as I have elsewhere mentioned (Wundt. *Philos. Studien*, Bd. 11 p. 137), dyes living tissues well and lastingly.

In conclusion I may remark that Prof von Frey intends to publish an account of his further investigations in the course of the year.

FRIEDRICH KIESOW.

LEIPZIG.

SUSPENSION OF THE SPATIAL CONSCIOUSNESS.

A recent note in this journal by Professor Hyslop on our localization in space induces me to record a somewhat similar but even more pronounced case of suspension of the power of localization. It is to be noted that the dream which in Dr. Hyslop's cases 'switched out' the ordinary date of localization was, unlike most dreams, accompanied by, perhaps caused by, hallucinations of vision, such as I have described in a recent number of the Journal of Comparative Neurology. The theory which seems to have been in the narrator's mind is that the existing mental picture forcibly displaced the memory image of the

actual place occupied. The tactile and other sensations were not adequate to displace the vivid hallucinatory image. The question in this connection which seems of greatest interest is whether the mind, in its waking state, must (or at least always does) orientate itself, whether correctly or incorrectly. Everyone knows by unpleasant experience that the tendency to extend this orientation to correspond with the limits of our field of space-conception is very strong and, once formed, the orientation is exasperatingly persistent. I had suffered from the inconvenience of being 'turned round' in unfamiliar places for many years until a simple expedient permanently rid me of the habit. The remedy consisted in charging the mind to suspend judgment of direction until an intelligent one could be formed. After a short struggle this habit was formed and, although mistakes have occurred, they have been due in every case to imperfect or incorrect data and I have never been 'turned round' since.

But the instance which it is desired to record seems to show that the mind may be for a considerable time completely unorientated in both time and space. The experience referred to has occurred to me no more than three times and the period has in two cases been quite short, while in another the time was long enough to provide for a careful study of the state. It was some months after a return from a residence in Berlin lasting several months. Meanwhile the home had been removed from Cincinnati to Granville. Yet there had been a long period of quiet routine at the new home, and the unsettled feeling which an ocean journey always produces had long since worn off. I had been for some time studying dreams and had acquired the habit of collecting my thoughts and attentively observing states following the awakening. Under these circumstances I awoke near midnight from a quiet sleep without any dream content being immanent. The room was absolutely dark and quiet. I lay at ease and it dawned upon me that I had no notion of where I was. I turned over in my mind the various sleeping apartments in which I had slept. Was this the state room of a steamer? Evidently not, for there was neither noise nor jar. Was it one of the three bed rooms I recalled in Cincinnati, or was it perhaps in Berlin? I could not tell. What had I been doing the day before? I had not the faintest idea. The events of one period of the past seemed as vivid and 'present' as those of any other. For some reason the sequence of events seemed gone, though many isolated occurrences were clearly recalled. I lay some time waiting for the appearance of some associated chain, but none emerged. A momentary fear that I had been smitten with blindness was relieved

by a faint glimmer from the window. I then made several slight movements but could still get no idea of the shape of the room or of the position of objects in it. The necessary link was at last afforded by a movement on the part of my companion and a few tactile coördinations without the aid of vision. The state impressed me like that of a disembodied mind, but there seems to have been no special vascular stasis at the periphery, though it is, of course, probable that some circulatory changes had occurred in the brain. Tactile sensations were as usual. It thus is evident that the mind may operate in an apparently normal way with full consciousness and yet the correlation of vestiges necessary to localization be wholly suppressed, though other spatial reproductions are unimpaired. It is also seen that the orientation does not depend on vision or any one sense, though visual elements predominate when the orientation is at last affected. As I have said, this is not an isolated case, though in the other instances some sense impression has completed the spatial rapport before the state could be calmly observed.

DENISON UNIVERSITY. C. L. HERRICK.

FOCAL AND MARGINAL CONSCIOUSNESS.

There seems to exist among a large number of recent psychological writers a strange confusion of ideas respecting one of the simplest and yet most fundamental distinctions in the science. I mean that between sense content and sensation (not the content of the sensation, which is a very different thing).

The content of sense at any given time is the sum of the affectations of the lower or primary æsthesodic centres. In the visual sphere, for example, it is the totality of the immediate central reactions corresponding to the retinal excitations. We may think of them as distributed in the homologous parts of the tectum, but it is probable that we should add the effects of certain optic reflexes with their æsthesodic reactions, and not improbable that it will be necessary to include modifications or accretions due to changes in the cortical visual area; however this may be, there is as yet no sensation—only sense content. Besides the contents of the higher senses there is the whole æsthesodic contingent from the cord, many of whose elements never are brought into consciousness except under exceptional conditions. Some of them are perhaps incompetent to enter sensation at all, except as a *quale* of some other sensation, because they have no localizable 'tag' suit-

ing them to independent recognition or isolation. These are, however, just as really part of the sense content as are colors or pains.

Now it is evident to ordinary experience that, in many cases at least, the 'sensing' of a sense content *is an act*, not an occurrence. We fix a certain element; it is immaterial how we were impelled to the fixation of that particular element, the act is an expression of our spontaneity—a reaction of the subject. Many considerations justify us in supposing that an act of consciousness involves, on its neurological side, a reaction between the æsthesodic and the kinesodic system of the cortex. Only so can the intimate connection between perception and various forms of innervation be explained. Here is an attractive field which it is not possible to enter now. Probably most psychologists will agree that consciousness is an act, not a state, and that it is a pivotal act which takes place in the very focus of our being.

The unity of consciousness may be interpreted to mean that consciousness is only possible when the æsthesodic and kinesodic currents affect the equilibrium of the entire mechanism of consciousness. It seems possible to conceive of the situation as an instance of most complicated equilibrium where each element of the conscious mechanism contributes its tension to the balance of the whole. However this tension is affected, a conscious state may follow. It will be understood that on a purely dynamic theory there is no question of spatial unity, only of a common form of action.

Letting this crudely-expressed concept serve for present purposes, we are prepared to consider what takes place when any given content of sense is presented to the mechanism of consciousness. If it is a given color, for example, then the balance is disturbed in a certain characteristic way at the moment it is admitted. We perceive a color. If, instead of the color, a retinal picture of great complexity, say a landscape, is presented, the equilibrium is disturbed in a different way, though one which produces an instantaneous impression of as truly a simple sort as the other. It differs from the former in that this one is followed by the after-shower of innumerable vestigeal impressions from the optic and other associated areas which, each in turn, affect the equilibrium of the mechanism of consciousness. We insist that there must be in this ultimate mechanism of consciousness an absolute succession. A wave of consciousness in the sense in which it is postulated by James, and especially by Morgan, is inconsistent with any conceivable means of bringing sense impressions to consciousness. There are, it is true, in the sense content of vision audition and tactile sense, distinct apparatuses for producing focal and

marginal impressions. These are associated with localization and are most important in their bearing on the development of ideas of space, but the difference between them is one of degree or kind, not of order or succession, and would afford the same result whether reported cotemporaneously or successively. Just, then, as the various intensities of sense impressions afford a basis for focal and marginal sense contents, so a perspective of vestiges may be presented to consciousness, but we believe it a false use of analogy to claim that there are in cotemporary consciousness both focal and marginal elements.

We do not conceive that consciousness is bound by the same limitations as its intermediary mechanism, nor that it is proper to apply to it the predicates of succession or of time, but, in as much as we are concerned with the intermediary mechanism, the distinctions here insisted on seem to us important.[1]

C. L HERRICK.

DENISON UNIVERSITY.

NATURAL HISTORY OF THE CRIMINAL.

Permit me to remark, with reference to Dr. Hume's review of my *Naturgeschichte des Verbrechers* (p. 408, Vol. II. of the REVIEW), that its author seems not to possess sufficient knowledge of the German language to do full justice to a German author. Only on this supposition can I explain his remark that I 'have not only a very slight acquaintance with general psychology,' but that in my book 'there are references of contempt for those branches of study.' This latter judgment is absolutely erroneous; as to that, I refer only to the great number of books, on general psychology and psychology of ethics, which I have translated from the originals of H. Höffding, C. Lange, H. Ellis, C. Lombroso, E. Ferri, and others. Before expressing his feeling of deep disappointment with my chapter on 'Criminal Psychology,' Dr. Hume might have made reference to the preface, where I said, that I have been constrained to give only a short sketch of the fundamental problems of 'Criminal Psychology,' hoping to publish later my researches on murderers, vagabonds and cheaters.

Dr. Hume's imperfect knowledge reveals itself best in the manner in which he translates the title of the book: *Science of the Criminal.*

[1] The view that the higher orders of physical coördination are especially provided for in the cortex of the frontal lobes has received experimental support through the researches of Bainchi. See Brain: IV., 1895.

I have not the least idea of writing on the 'Science of the Criminal.' At the best it is possible to-day to give only the outlines of a 'Natural History of the Criminal,' and this is the title of my book.

BRIEG. DR. KURELLA.

THINKING, FEELING, DOING.

A review of my book in the last volume of THE PSYCHOLOGICAL REVIEW has come to my notice. It contains some statements that are quite misleading. I will pass over the injustice done to a book when its material and its form are criticised according to a standard with which it has absolutely no relation; it is a cheap and frequent method of exhibiting a young critic's superiority to judge a popular book as if it were intended to be a scientific treatise for the strictest specialists. I am, however, entitled to protest against the attempt to make it appear that my book is merely an adaptation of Wundt without proper credit. Your reviewer, for example, complains that, after stating that I am about to quote a few pages from Wundt, I put quotation marks around a couple paragraphs only. To any careful reader the text shows quite clearly that whereas the material is quoted from Wundt, there are minor changes and condensations in expression such as to render quotation marks not allowable except where used. At any rate, when an author expressly states that he is about to quote a few pages, it is but fair to take him at his word, whether he uses quotation marks or not. The critic again speaks of other quotations from Wundt without reference. These reduce to two paragraphs of pure matter of fact which were taken from Wundt, but which were scarcely entitled to a reference, as they consisted of the merest every day matters with no original thought. If the reader will only turn to the book itself he will find that I have given to Wundt and his books about all the credit a man can give.

Finally, the worst injustice of this attempt to make it appear that not enough credit is given to the master lies in the disregard of facts like the following: The preface speaks of Wundt as 'the greatest of psychologists;' the first chapter quotes him repeatedly; two other chapters contain special quotations; to the necessary rule of 'no references' an exception was made in favor of Wundt's *Vorlesungen;* the only footnote reference allowed in the book calls particular attention to a translation of Wundt; and finally the last chapter contains a biography of Wundt with a bibliography of his works and

the brightest tribute to his genius that the author could think of. It seems to me that I could hardly have done more to express the obligations of my book and myself to him. In fact, I intended to make the book a popular tribute to his genius and an acknowledgment of my obligations to him. I am happy to say that the tribute has been accepted with the kindest expressions from the master, and I sincerely trust that the large sale of the book has carried the news of his fame into nearly every American household.

E. W. SCRIPTURE.

This acknowledgment to Wundt is both timely and honorable. The reviewer must have been very stupid, as well as young and superior, for apparently he failed to make intelligible the most important part of his criticism. Messrs. Creighton and Titchener are the gentlemen to whom above all others explanations and apologies are due. But their names do not appear here. Possibly they will feel, however, that Dr. Scripture's explanation is sufficiently luminous and inclusive to be satisfactory without any definite mention of them. And anyway, forbearance will be a necessary virtue. For the book by taking refuge in 'nearly every American household' has obviously outrun all possbility of successful pursuit.

JAMES B. ANGELL.

PSYCHOLOGICAL LITERATURE.

The Growth of the Brain: A Study of the Nervous System in Relation to Educatian. By H. H. DONALDSON, London, Walter Scott. New York, Charles Scribner's Sons. Pp. 365.

This book has been written with such complete appreciation of the requirements of the best scientific method, and the author has shown such untiring patience in collecting and analyzing all the facts which could be made useful, that he deserves to have ascribed to him that *besoin de la verité* which Louis speaks of as a so much rarer gift than the taste for scientific investigation, with which so many set out on their work. The only real criticism which we have to make is that the range of subjects is so great that the reader, unless well versed in the literature of neurology and anthropology, must find his progress slow and laborious. The style is clear, but the statements are, necessarily, concise and condensed. The very richness in data which makes the book so valuable, also makes it one of which it is difficult to give any adequate sketch within the short space of a review. As giving an idea of the wealth of material utilized, it may be noted that no less than sixty-four tables of figures are reproduced and studied.

How may we best hope so to modify the nervous systems of individuals and races that the work which they do will be more and more effective? This is the question for which Dr. Donaldson would be glad to find an answer, but he recognizes, more clearly than do the eager parents, teachers and physicians to whom the same problem presents itself, that before we can approach the solution we must learn to know under what laws the development of the nervous system normally goes on and what the conditions are that make the brain a better organ, independently of education.

Neither the brilliant achievements of formal education nor the progress that civilized races have made in their pursuit of knowledge are a sufficient warrant that a superior and better type of brain is being created. "Knowledge comes, for the hindrances to knowledge are in a large measure from without, but wisdom, as heretofore, continues to linger, and still to occupy its place as the rare performance of the balanced brain."

The first chapter contains a concise statement of the best biological researches in the study of growth. The whole of this is important, especially so is the reminder that, in the human nervous system at least, the production of new cells ceases some time before birth, and that the rate of growth, which, after birth, depends on the increase in size of cells, diminishes rapidly from birth onward (Minot and others). But though no new cells are formed after birth, the capacity for physiological development is not quite so fatally restricted as one might imagine, since there is always a reserve of nerve elements which do not, in the first instance, fully develop, but remain capable, to a certain extent, of subsequent change.

The life of any individual is practically a process of adaptation to surroundings, and this is marked at every point by a specialization of function, which leads eventually, when the power or adaptation becomes less, to impairment of coördinated activity and finally to death. It is not improbable that a law of this sort governs the life not only of individuals, but of species.

The special study of the growth of the brain is introduced by a brief but excellent analysis of the observations through which the laws of growth of the body as a whole have been ascertained, and then the relative growth of the different parts of the body is studied, with constant comparison of males and females. The writer's searching review of the various researches upon the weight of the brain and spinal cord at different ages, in the different sexes, and as related to size of the body and to intellectual eminence, will long be consulted as an impartial statement of the case, although, as he says, it is plain that the facts "contribute mainly to a healthy scepticism concerning the current interpretations of brain weight." It is impossible to judge by the scales alone about the intellectual capacity of a given person, or even whether he was healthy, criminal or insane. Where the weight falls below a certain minimal point, indeed, we are justified in assuming a defective mind, but here questions of structure come in which the author next proceeds to study.

It has already been pointed out that growth consists partly of cell multiplication, partly of an increase in the size of the cells. A careful estimate shows that at the end of the first twelve weeks of fœtal life the volume of the nervous system is about 2.25 cm. cm. By this time the number of nerve elements, or neuroblasts, has pretty much reached its limit, which is somewhere near three thousand million. The volume of the adult nervous system may be estimated as 1005 cm. cm., and, therefore, the average increase of size of each neuroblast is

nearly five hundred times, though in fact the increase in the case of of many of them is many times as great as this.

"The determination of the number of neuroblasts occurs so early in the history of the individual, and under such uniform conditions, that it is very difficult to regard the environment as possessed of much power to cause variation in this respect, and for this reason, among members of the same race a high degree of constancy in this character is to be anticipated. The influence of the surrounding conditions becomes much more effective during the later stages of development that accompany the enlargements of the elements already formed, and it is during this period that adaptive modifications may occur." (p. 162.)

In the next chapter the following significant questions are asked and provisionally answered:

"1. By what means does the brain of the new-born attain the weight found in the adult, and decrease again during old age?"

The greatest factor in both the increase and the decrease is the gain and loss affecting the *medullary substance* which surrounds the processes of the nerve cell.

"2. Why do tall persons have heavier brains?"

This is probably due to increase in the size of the nervous and non-nervous elements arising from the greater cranial space allotted them for growth.

"3. What significance is to be attatched to the fact that the brain-weight is different in different races?" The provisional picture to be formed of the brains belonging to those races least capable mentally is that of one in which the number of cell elements is approximately similar to that in the most capable races; but many of these elements being but partially developed, the organization of the brain is less perfect, though the size is not thereby greatly reduced.

"4. What significance is to be attached to the difference in brain weight existing between men and women?" (and found, strangely enough, even among the defective classes.)

This difference must depend on the fact that the structural elements in the encephalon of the female are smaller than those in the male, and it is probable that, other things being equal, the larger cells have more stored up energy and permit of more compiete organization.

The writer then gives a summary of the architecture and structure of the brain and cord which is full of interest. It hardly admits of analysis in a short review. In the course of it he refers to his own careful investigation of the brain of Laura Bridgman.

The chapters of most interest to the educator are those in which the physiological rhythms which characterize the nervous functions are dwelt upon at some length; then those which deal with fatigue and old age. The two final chapters are devoted to the study of education and to the statement of the 'wider view.' These deserve to be read in detail, and the reviewer will think his task sufficiently well performed if he has indicated on how wide a basis of positive data Dr. Donaldson's moderate but interesting practical conclusions are built up.

JAMES J. PUTNAM.

HARVARD MEDICAL SCHOOL.

Mental Development in the Child and the Race: Methods and Processes. JAMES MARK BALDWIN. New York, Macmillan & Co. 1895. (2d edition, 1895.) Pp. xvi+496.

Professor Baldwin's most recent book has already received much attention, and hardly needs introduction to the readers of this REVIEW. The volume is founded upon essays previously published; but in its wholeness it is an essentially new piece of work, which constitutes, so far, its author's most mature and original contribution to his science. It contains an uncommon union of decidedly special, empirical observations with comparatively recondite and very far-reaching evolutionary speculations. The present reviewer, as himself professionally disposed to the speculative, may very properly give his attention mainly to the latter aspect of the book, although well recognizing the high merits of the other aspect.

In its literary character this work, always as to all the details of the exposition pleasantly and stimulatingly written, is still in some of its most important features disappointingly obscure. Professor Baldwin's habit of referring to coming chapters for the explanation of the points that his present argument leaves unelucidated is too insistent, and has caused perplexity to more readers than one. Perhaps an author who deals especially with the phenomena of 'accommodation' may be doing well to enable the reader to make numerous subjective observations of the accommodation process while getting used to a novel and complex train of thought; but has not Professor Baldwin gone in this respect too far? To be sure he can be, and often is, so clear, especially as to the single sentence, illustration or argumentative point, that we are often most of all baffled in trying to make out why it is that just the connected whole, the unity, the total bearing of his reasoning, long escapes our close attention. Yet the result, when we get it, repays a good deal of trouble.

How does an organism come to make novel adjustments? How can new habits of a useful kind get formed? How can mind grow? What is the basis for the organization of experience, viewed as novel experience? In fine, how is 'accommodation' to be psychologically and biologically explained, in the individual and in the race? Here is the central problem about which Professor Baldwin's evolutionary speculations are grouped. Of old the organization of experience, as studied by the psychologists who followed in Locke's footsteps, and who developed the association psychology, meant primarily the grouping of the impressions and ideas, or of the Herbartian *Vorstellungen*, viewed as data received, retained and associated. That the experience of the mind influences conduct was regarded as a matter of relatively secondary import in the study of mental growth. But nowadays the psychologist is dissatisfied with confining his attention to these mental data, in so far as they merely come *to* the mind. One observes that the experience of a live creature is useful to the possessor *only* in so far as this experience influences the movements, organizes the conduct, calls forth or adapts the adjustments of the creature itself; and since Spencer's Psychology the problem of the organization of mental experience has been inseparable from the evolutionary problem regarding the acquisition of serviceable motor habits upon the basis of sensory stimulations. Every evolutionary psychologist attempts more or less elaborately and explicitly to trace the beginnings and the growth of mentally significant adaptations, and to correlate what we know of mental processes with such adaptations. In this field the well-known hypotheses relate, on the one hand, to the influence of natural selection upon the evolution of mentally significant capacities for motor adjustment, and, on the other hand, to the variously interpreted relations of pleasurable and painful stimulation to the modification of motor processses.

Professor Baldwin's contribution to this discussion may be briefly indicated, but cannot be quite fairly developed within the present limits. After devoting considerable attention (p. 180 sqq.) to an argument showing that the experience of the pleasurable or painful *results* of movements once made cannot be relied upon as a factor sufficient to explain the way whereby an organism not already provided with useful motor adjustments may acquire such adjustments, Professor Baldwin proceeds henceforth, in his speculations, upon the postulate that, in order to explain the origin of specific accommodations, *i. e.*, of definitely useful motor adjustments, "a theory of adaptation must have reference to the repetition of stimulations, funda-

mentally, not of movements" (p. 451). One must suppose, namely, that, in advance of all definite habits of motor adjustment, and in the absence of inherited tendencies to definite acts, a virgin organism (if we may use the phrase)—one standing at the outset of the evolutionary process—possesses just one, highly generalized, but essentially plastic motor tendency, whose origin (p. 203 *et passim)* one must refer to natural selection. This is the twofold tendency to expand in the presence of stimulations which exalt, and to contract in the presence of those stimuli which depress vitality. That such simple reactions to the presence of light, of food and of injurious objects exist and are universal amongst organisms of even the lowliest type is well known. The present theory supposes that the stimulations which cause expansion are pleasurable, and that those which cause contraction are painful. But now the expansion tendency is the representative of a vital 'excess,' an overflow of energy. From its nature it tends to lead the organism in question nearer to the source of the advantageous stimulation, and hereby it tends to produce a '*repetition*' of this stimulation, which again results in further excess, and in more movements of the same sort. This tendency to move so as to secure a repetition of the favorable stimulus involves, however, at every step, by reason of the very excess which is essential to the process, relatively novel movements. If these new movements, in so far as painful accidents do not check their appearance, tend to get fixed, as they do, in the form of habits, the organism, wherever it is exposed, thereafter, to new stimuli, will now be no longer virgin. For, in addition to its original and generalized tendency to expansion and contraction, it will henceforth have definite tendencies to certain movements. The nature of these movements, in view of their origin, and in view of the fact that all pain-giving or even useless accidental accompaniments of the excess process have tended to be excised by the original tendencies to draw back from the painful, and to emphasize the pleasurable stimuli, will be such that the newly acquired movements will be *apt to repeat stimuli of a certain type.* Henceforth the now trained organism will more and more tend to this type of 'circular reaction,' moving in the presence of certain types of stimuli so as to repeat or to enforce them; moving in the presence of other stimuli (*viz.* painful stimuli) so as to avoid repeating them. Upon this 'circular' type of reaction, as Professor Baldwin ingeniously insists, the remainder of the process of mental evolution is founded. This is the type to which, as readers of Professor Baldwin's remarkable paper in *Mind* and readers of this REVIEW well know, our

author applies the general name imitation. Every new type of imitative or circular reaction once thus acquired becomes a basis for further modification or adaptation through the influence of new stimulations, whose effectiveness, in all pleasurable cases, will be ensured through the very existence of the repetition tendency itself. On high levels the circular reaction appears as the act of attention, whereby the effect of a given stimulation is, through repetition, so heightened as to ensure its effectiveness in causing accommodations. "In general" (p. 179) "the law of excess may be stated," says Professor Baldwin, "somewhat as follows: The accommodation of an organism to a new situation is secured, apart from happy accidents, by the continued or repeated action of that stimulation, and this repetition is secured, not by the selection beforehand of this stimulation, nor by its fortuitous occurrence alone, but by the proximate reinstatement of it by a discharge of the energies of the organism, concentrated as far as may be for the excessive stimulation of the organs most nearly fitted by former habit to get this stimulation again." Granted the repetition, and the accompanying excess, then the organism gets adapted 'by chance adjustments occurring among excessive diffused movements' (p. 198); since the process of repetition tends to favor these movements, so that ere long they become habits.

A crucial case for this theory of the acquisition of new fashions of movement is furnished by the phenomena which (p. 373) first attracted our author's personal attention to the considerations that now have taken form in his theory. These are the phenomena of the rise of volition in the child. Volition, our author insists, is a phenomenon, at the outset, of 'persistent imitation,' of the 'try-try-again' tendency of the child. In so far as an organism inherits tendencies which early, under the influence of pleasure-pain experiences, get welded, without deliberation, into even complex movements, such as are involved in holding the head erect (p. 390), Professor Baldwin does not consider these cases of volition. The acts that thus early get established may, by reason of the generally imitative character which all the organic responses to the environment must possess, appear, in children, as simple imitations. But these simple imitations, acts which, without deliberation, tend to reproduce given stimuli, are not yet voluntary. On the other hand, in the case of the 'persistent imitations,' the child has a model before it, and is first stimulated by this model to an act of more or less inaccurate involuntary imitation. Hereupon, however, the child is dissatisfied with the presented contrast that now appears between its model and this imperfect imitation.

The dissatisfaction gets expressed in an intensely attentive tendency to watch the objective model, and to repeat with variations the imitative act. The resulting process of trial and error may be a very extended one, the attention to this process may be long repeated, until at last the imitation comes to resemble the model enough to satisfy the child. This process constitutes, in Professor Baldwin's account, the first appearance of true volition, since here is an ideal, long attentively held before consciousness, and the gradual and persistent adjustment of means to ends.

These being, according to our author, the observed facts, it remains still to indicate the theory of the process of persistent imitation. Why this strained attention, this long pursuit of the ideal, and why—here is, of course, the more difficult question—why and how does this process of persistent variation of the first response to the model gradually tend to the establishment of acts which actually repeat the model more closely than the first act did?

Professor Baldwin's theory as to this matter is best stated on page 453: "In persistent imitation the first reaction is not repeated. Hence we must suppose the development of a function of coördination by which the two regions excited by *the original suggestion and the reaction first made coalesce in a common more voluminous and intense stimulation of the motor centre.* A movement is thus produced which, by reason of its greater mass and diffusion, includes more of the elements of the movement seen and copied. This is again reported by eye or ear, giving a new excitement, which is again coördinated with the original stimulation, and with the after-effects of the earlier imitations. The result is yet another motor stimulation or effort of still greater mass and diffusion, which includes yet more elements of the 'copy.' And so on, *until simply by its increased mass, including the motor excitement of attention itself*, by the greater range and variety of the motor elements thus enervated, in short, by the *excess discharge* the 'copy' is completely reproduced. This, it is evident, is just the principle of 'excess,' and it is very easy to find in it the origin of the attention. The attention is the mental function corresponding to the habitual motor coördination of the processes of heightened or 'excess' discharge."

In this conception, it will be noted, the general theory of excess, as stated above, is applied to the special case of volition, by the hypothesis that the being who possesses the power to acquire voluntary skill differs from beings lower in the scale by the presence, in his case, of centers of coördination where the continuation of the stimulus that

produced the primary or simple imitation meets, later, with the resulting stimulus due to the perception of the imperfect copy. The result of this meeting is a new and more intense motor stimulation, involving at once attention and diffused new motor processes. That some of these new motor processes result in agreement with 'more elements' of the model is due simply to the fact that they *are* more numerous and diffuse than were the motor processes of the first imitation. And volition is now present, just because volition involves an element of persistent anticipation of a complex act that, when it comes, is to realize an ideal.

The natural question arises here, as in Professor Baldwin's other discussions of the results of the excess process, why it is that, when the successful imitation at last results from this process of excessive stimulation, the unnecessary or unfitting portions of the motor excess fall away. While the child is learning, in this persistent imitation, the essence of the process, according to the theory, is that the stimulation of the 'coördination-center,' through the combined sensory effects of the model and of the resulting imperfect efforts to imitate it, leads to excessively diffuse movements, *some* of which, by virtue of the mere diffusion, tend to produce results agreeing with the model. But since many of these diffuse movements of excess (such as kicking, tongue-movements, and the like incidents of the strain of learning) do *not* tend to make successful copies of the model, why do they later disappear and leave the successful imitative deed to become a settled habitual acquisition?

Professor Baldwin's response to this question is (p. 445, *cf.* p. 377) that "When muscular effort thus succeeds, by the simple fact of increased mass and diffusion of reaction, the useless elements fall away because they have no emphasis." Or, as p. 377 states the case, 'the useless elements fall away because they are useless.' It seems plain that considerations equally undeveloped govern our author wherever he speaks of that elimination of the useless or unadaptive elements of the excess-discharge which all grades of the process of accommodation, from the lowest up, appear to involve. Surely the very nature of the excess-discharge, in advance of definite adaptation, must be that it generally involves useless reactions quite as probably as useful reactions. The only apparent exception to this would be furnished by the primitive expansion movements noticed above. They, it may be said, inevitably involve a tendency to reinforce their stimulation, and to continue its presence, because the expanded organism will, as such, offer more surface to the source of stimulation. But as soon as one passes

from this primitive state to the case of an organism having activities already complex, adaptation through the chance results of excess will apparently occur only in connection with the initiation of many una daptive movements, which will need to be eliminated whenever the accommodation can become perfect. If one writhes or kicks in learn ing to draw, a positive theory is needed to account for the rapidity with which these unnecessary movements fall away after the occurrence of the successful imitation; or, even before that occurrence, since one must take theoretical account of the further fact that *such* excess-movements generally oppose the attainment of an accurate imitation, and must, therefore, in part, be eliminated *before* the first accurate imitation can occur.

Of course the elimination of painful and of positively unsatisfactory movement is used by Professor Baldwin as a coördinate factor in this process of the reduction of the excess to its due form (see p. 143). But this does not of itself explain the inhibition of such useless elements of the excess as are not directly felt to be in themselves unsatisfactory. Yet such elements might be not only present, but actually injurious to the imitation. An awkward man tries to acquire a new imitative art. He reacts to his model, and then observes the inadequacy of his first imitation. The perception of the incongruity excites his coördinating centers. The result is a new set of efforts, which may involve numerous excess-movements. Of these some will of themselves tend 'to include more elements' of the model. But some of them, perhaps most of them, will not only be superfluous, but will also actually stand in the way of the accomplishment of the desired aim. For, if the model is at once complex and definite, inhibition of the unnecessary will be an essential part, and, in most cases, a preliminary, of the first success. The immediate result will so far be that increased effort, in advance of inhibition, will mean failure. The 'more elements' of the right sort will be so mixed with 'more elements' which lead astray, that the total results will perhaps be no gain in accuracy. Now, if the awkward man can himself analyze his act and discover that the inhibition of certain superfluous elements would ensure success, *then*, but only then, will these superfluous acts become, by association, disagreeable to him, as hindering his ideal, and meaning failure. Thereupon the elimination of these elements will become easy to him. But surely a learner who can analyze the source of his own failure has already come to stand high, through previous success, in the imitative art. On the other hand, the really awkward man may easily be sensitive enough to be dissatisfied with his failure, and

yet may be unable to analyze the cause of his failure. He makes, in one act of persistent imitation, superfluous efforts and useful efforts. Who is to tell him which of his efforts are the superfluous ones? What influence is, in advance of success, to overcome, to inhibit, the hindering elements of the excess-process? Their own disagreeableness as hindering elements. But it is for him, unless he is already skillful enough to analyze, only the total result whose failure is disagreeable. The superfluous parts, by themselves, cannot appear to him, separately, disagreeable enough to get inhibited, unless some preëstablished harmony makes them so. The awkward man will try and try again, with excess and failure constantly attendant upon his efforts. The more he strains, the more superfluous efforts will he make, until the whole process ceases in painful exhaustion. Here there will be no necessary tendency of excess to secure ultimate success.

Now this is no merely imaginary case. This is the process of failure in many instances of industrious awkwardness. This is what happens when we think vainly over our problems, and yet get no result. This is what happens to the socially awkward, who attempt social enterprises only to get more and more lost in the chaos of their own excessive efforts. This in particular is what happens in our personal relations to the people with whom, despite our best efforts, we 'cannot get on.' In trying to conform to their ways we attempt useless acts of conciliation, make ineffective chance remarks, complicate our relations through unnecessary explanations, and yet can never quite find out what it is that makes us go wrong. The excess reactions then, as such, need not involve useful *plus* merely superfluous reactions that will not positively hinder success. The excess reactions may, and often do, involve a union, that is for the striving learner unanalyzable, of useful and of positively hindering acts. The question here is what magic in advance of success is to ensure the inhibition of the elements of hindrance thus involved in the excess discharged?

But does one reply, with Professor Baldwin, that actual observation of the child's imitative successes shows, first the excess reactions, and then the inhibition of the superfluous elements? Hereupon one can but retort that the very problem of the acquisition of new habits is: How do these inhibitions of the superfluous elements take place? Does one say: Success is sometimes possible? The obvious retort is, What particular factor leads to success when the latter does occur? To this problem, so far as the present reviewer can see, Professor Baldwin has given very scant attention. Yet, unless this problem is

definitely faced and solved, an appeal to the facts of excess, interesting as it is, must prove wholely inadequate to show how definite new habits can get formed. For, as a fact, whoever learns a new habit, either by persistent imitation, or by some less intelligent process, learns more numerous inhibitions than he does positive adjustments. This appears to be true low down in the animal scale as well as higher up, and the difficulty developed in the foregoing is one of a very general application. If excess is the beginning of novel adjustment, selection amongst the elements of the excessive reactions to interesting stimuli involves much more than the merely superior emphasis given to certain of these reactions by their pleasure-giving character, or even by their success as imitative reactions. Nor is the principle that the painful elements of the excess get eliminated by reason of their painfulness a sufficient account of how the needed inhibitions occur. For there remain to be accounted for the vast number of superfluous reactions which are not directly painful, but which are *indirectly* opposed to the definiteness and success of the new habit. The animal acquiring a novel skill in watching for prey must learn to suppress numerous signs of excitement which will indirectly hinder the success of its quest. How shall the principle of excess and selection work here? The excitement-phenomena will belong to the excess-wave. Whence will come the selection? From the animal's own intelligent observation of the hindrances that result from these superfluous acts? But it is the *origin* of just such intelligence that we are here tracing. No intelligence of this grade can exist unless definite successes have already given the animal a criterion for judging its own failures. The imitative animal must learn, and does learn, to be silent and hide when the others do so, to stand still and watch when the others do so, and in countless other ways to imitate inhibitory deeds and attitudes. But in the case of the imitation of inhibitions, how is the excess, merely as such, to contain 'more and more' elements that gradually conform to a model whose very essence is that its outward appearance involves a suppression of elements, the negative fact of the absense of certain groups of deeds. On the other hand, to explain all these inhibitions as due to the experience of the painful results of the acts suppressed is simply to abandon the region where a theory of imitation ought to have most scope, viz: the region of the imitation of inhibitions, or of acts in so far as they involve inhibitions. For, as pointed out, every complex positive act involves more inhibitions than it does positive activities.

Now, it is indeed true that Professor Baldwin has given some at-

tention to the conditions of inhibition and of selective self control. But so far as the present reviewer is able to understand the very summary observations upon p. 473, our author appears to regard the problem of inhibition as altogether a secondary one. On p. 456 we do indeed find stated, as in several other passages, the 'problem of selection,' with some indication that the excess-function needs a selective accompaniment over and above the ones upon which our author lays most stress. And, as Professor Baldwin here adds: "In attention we have, undoubtedly, the one selective function of consciousness." One expects to find, accordingly, in the subsequent discussion of attention a genetic explanation of the obviously inhibitory character which forms so large an aspect of every attentive process. But what one finds is a valuable development of the doctrine of the positive motor elements of attention. At the end comes the passage of p. 473: "The theory of motor development now worked out throws much light also on the whole vexed question of muscular control—the regulation of movement in amount and direction, and its suppression, etc." There follow two or three sentences regarding the positive aspect of control, and then the words: "And negative control or inhibition represents, in general, the limitations which old organic ways of action impose upon our ways; the new must conform, if possible, to old organic 'copy.'" Surely, this means, if anything, that the presence of inhibition, at least where the latter is not a direct case of the results of painful stimulation, is due to the influence of old imitative functions already set in the organism. The present reviewer's difficulty is, however, that some sort of inhibitory process, not wholly due to directly painful stimulation, must be posited in order that the first important selections from any excess reactions should take place; that Professor Baldwin's discussion everywhere silently presupposes the presence of just such an inhibitory aspect of the whole selective process; that the dropping of the superfluous reactions, merely because they are not emphasized by success, is wholly insufficient to explain the actual selection upon which all new adaptation depends; that, as every teacher knows, some dropping of the superfluous is, in general, a necessary *preliminary* to success in novel adaptations; and that, therefore, in the absence of any teacher to do the inhibiting, the organism itself must contain the conditions for such inhibition of the superfluous; and that, in fine, without such primary inhibition, no theory of excess reactions can possibly explain the acquisition of definite new habits.

To conclude, then, the theory of the origin of imitation will be, in

the present reviewer's opinion, whenever it comes, a theory of the origin of inhibition quite as much as a theory of excess functions. The presence and importance of the latter, the excess functions, Professor Baldwin has, indeed done well to recognize; but the theory as he leaves it is essentially incomplete, for the lack of any genuine explanation of the selective process everywhere presupposed by the whole discussion. Despite this essential gap in this theory, the volume before us is so full of ingenious observation and of courageous speculation, as to leave no enlightened reader in doubt of its author's power both to see and to think, and doubtless, ere long, to lead us further into the world where he has already done such admirable work. Agreeing fully, as the present writer does, with the prominence given in this book to the value of imitation for the whole of the higher mental processes, rejoiced as Prof. Baldwin's reviewer is to find in many pages doctrines as to the psychology both of imitation itself, and of the intelligence generally which he would have been glad, indeed, to have been able to express himself, one can only regret, in closing, that the foregoing comments have often been as negative as they have been. But it is by temporary disagreement that our common interests often find themselves in the end best furthered.

HARVARD UNIVERSITY. JOSIAH ROYCE.

Studies in the Evolutionary Psychology of Feeling. HIRAM M. STANLEY. London, Sonnenschein; New York, Macmillan. 1895. Pp. VIII+392. $2.25 net.

Mr. Stanley's book is, in my opinion, an interesting and important contribution to genetic psychology. It takes up the Spencerian formulation of the problem of mental development—the interpretation of the functions of the individual consciousness in the light of race-utility—and attempts to throw light on this question by the introspective method. As far as such a problem can be approached by such a method, Mr. Stanley approaches it; but he cannot, I think, discover in the adult mind a science of mental embryology. With this essential limitation of method—a limitation which is not accidental, but which Mr. Stanley defends—his results are rich in suggestiveness, and mark the author as entitled to a high place among contemporary authors in developmental psychology. This the more because his results are peculiarly his own, as his method necessarily makes them. With this general appreciation of the book, which I do not intend the criticisms which follow in any way to impair, I may set out a few

points of the more essential results which the author reaches, and speak to them from my own point of view.

Mr. Stanley makes pain-consciousness primitive—what he calls 'pure pain.' It is accommodation agent through the 'will-effort' which it leads the animal to make in order to rid itself of the pain. Pleasure consciousness is a later state arising between want-pain and excess-pain. The derivative character of pleasure is argued at some length, but with arguments of an introspective character; although here as elsewhere Mr. Stanley deserts his method by appealing to the child consciousness and hints at biological facts. I think that all the points made can be met by facts from biology and child-psychology; but this is not necessary, since Mr. Stanley says in another place (28) in answer to points made by Mr. Marshall that he is not concerned to maintain this thesis and is quite willing to believe that pleasure and pain are equally primitive. This is generous, certainly, but it shows the essential weakness of the author's method. The point at issue here, I venture to think, is one of the most fundamental in all the theory of development. A number of Mr. Stanley's own later doctrines rest upon the probable truth of the claim that pain alone is primitive accommodation agent. And the admission made here that it is not, weakens the ground theory of the book all the way through.

The second element of Mr. Stanley's conception of the fundamental reaction, *i. e.*, 'will-effort,' finds no analysis or discussion that I can see anywhere in the work. It seems to be assumed along with pain as an ultimate characteristic of mental life. But even then we ought to have some notion of how it works to bring about the adaptations of the organism. This great defect is what I referred to above in defining Mr. Stanley's problem as the problem of race development. The parallel question of individual development—the ontogenetic question—seems not to have occurred to him. And yet, is not that just the question for which the introspective method is available? Here it seems to me Mr. Stanley shows a little want of touch with the discussions of current psychology—a sort of personal isolation, as it were. Why does he not bring in some reference to the recent discussions of motor phenomena, kinæsthetic doctrines of voluntary action, reduction of will-effort to a sensational basis, etc. Surely these theories are the most formidable opposites to the vague postulate of will-effort, which he fails even to define. The resource of child-psychology, which Mr. Stanley ranks next in importance to simple introspection, should give him an inkling of the need of settling this great problem. Spencer saw the necessity for a theory of the individual's

adaptations—the more, perhaps, because of his Lamarckism in the doctrine of heredity; but there, in heredity, is another question the importance of which Mr. Stanley seems not to have appreciated. I do not mean these things as criticisms of a positive kind, in the face of Mr. Stanley's modest assurance that the book is only a series of studies. But yet when he uses phrases equivalent to 'will-effort' so freely, it can not fail to occur to the reader that it is a bridge of thin ice over these yawning caverns.

Again I think Mr. Stanley's free—I almost said indiscriminate—use of the principle of 'variations with natural selection' leads to little new truth. Cognition is a variation (6173) under which sensation, perception, memory, etc., are all variations. Attention, self-sense, and so on everywhere—all are variations. And then Mr. Stanley seems to think, that his problem is solved when he has pointed out some introspective or speculative utility which, in the mind of the psychologist, should justify this or that variation—*after the fact*. This gives a set of small unimportant problems which each one can settle for himself, as he thinks the facts 'most likely' were. But it is as if the biologist should say: The law of variations with utility solves the question of life; and for this organ or that, its utility assumed, its use was probably this or that. The biologist, on the contrary, goes to paleontology and morphology, and those are the fields where the real facts are found to justify the theory of evolution. The psychologist has his paleontology in the animals around him and his morphology in the nursery. And while, of course, we have immeasurable difficulties to deal with, yet the real emphasis is thus thrown on the problem of individual or ontogenetic development, where the actual utilities may be seen in operation. It is not a mere question of surmise as to this utility or that. I do not insist on this here because it is a matter of personal conviction which I have recently urged at length in my book on *Mental Development*. The principle of circular reaction which I became convinced was of the first importance in the development of the individual development seemed applicable then in race development as well. Whatever may be thought of such a particular sort of formulation, I am yet more than ever convinced, by this able book of Mr. Stanley's, that no mere introspective or descriptive surmises about race-utilities can take the place of some such principle of unity arrived at first by way of the ontogenetic problem.

This point of criticism holds, in my view, all the way through the book. The chapter on the 'self-feeling' is full of keen verbal distinctions, most of them true to introspection as matters of description,

most of them requiring a general appeal to the law of variations, and many of them important for general psychology. But Mr. Stanley draws inferences for race-development on such grounds; and whether we agree with him or not depends largely upon whether we follow his distinctions and accept his definitions—and then what is the outcome? Why this: that so, and so, was probably the utility which the animal found in becoming self-conscious! But let us once turn to the field of morphology, the nursery, and enquire into the actual conditions under which the sense of personality arises, and I think one of the two most compelling and conspicuous factors in the whole group of phenomena, is just a factor which introspection has not revealed to Mr. Stanley at all—though even by that method I think he should have got glimpses of it—the fact, namely, that the sense of self—using the term in Mr. Stanley's sense 'as a reflection of experience upon itself'—'by which the individual becomes aware of its own activities as its own' (254)—comes by way of the progressive social consciousness. And if this be true would not the variation in the race series which the self-sense supposes (254) involve this differentia as well as that deduced from the direct interpretation of the private pleasures and pains of the organism? And so be a much later thing than his introspection suggests? This I do not mean to argue; but only to say that in the one case we are in the domain of live concrete facts, sufficiently objective to have positive verification; and moreover we are at a stage of the individual's development at which the elementary facts which we want to observe are likely to be found. To speak again of my personal views, I find with Professor Royce that the sense of self may be treated with some degree of explaining force by the principle of 'circular' or 'imitative' reaction, drawn from ontogenetic observations.

The chapter on attention is, from the point of view of the criticism made above, the most inadequate in the book. Mr. Stanley makes attention the great vehicle of 'will-effort;' thus throwing it in any case, I suppose, on the active side, the motor side, in the process of development. But as for 'will-effort,' so *a fortiori* for attention, we must ask: how does it work? What apparatus does it use? How does it effect organic or ideal accommodation? To these and the almost innumerable questions besides which come irresistibly up when one thinks of the attention genetically, Mr. Stanley has no answer, because he does not ask them. Certainly the bare phrase 'will-effort,' with its equivalents, is not at all illuminating.

I have left for the last the treatment of the Emotions, in many re-

spects the most interesting and valuable parts of the book. This is so, I think, because in this field there are many introspective distinctions to be made, and also because the expressive characteristics of the grosser emotional qualities are so well differentiated objectively as to suggest interesting race utilities. Fear and anger are treated in detail with subtlety and profit. Fear is primitive emotion, and emotion is fundamentally 'pain at pain.' This formula means that emotional pain is due to revival of painful object with consciousness that it is painful (67), (98). This latter element is essential and constitutes the difference between emotion-pain and pure-pain. In this discussion Mr. Stanley lays all the emphasis on pain, none on pleasure, except to point out the contrast of the two qualities of emotion. The duality here, I suppose, is possible because emotion as revival-state does not occur until after pure-pain has differentiated itself into pain and pleasure states. And yet the organic evidence, to my mind, points the other way, namely, to the conclusion that the contrast of pleasurable with painful emotions points to the original presence of a distinction between pleasure and pain. Furthermore, I do not think that Mr. Stanley makes out his point that emotion-pain is 'pain at pain.' The consideration of the evolution of emotional attitudes in recent discussion has tended to show that less rather than more stress is to be laid upon the representative element in emotion; and more on the reflex element. The pain of emotion is largely immediate pain due to function of an hereditary kind. And even when the emotion is one learned by the animal in his own experience I think the pain of it is rather pain from the incipient revival of the reflex consequences of the cognition than from the cognition of 'pain-quality' in the object. So of pleasure, in emotion. As far as there is a new pain or pleasure of revival, it comes from direct accommodation to present experience of object. Of course, in our high reflective lives we have plenty of 'pain at pain.' But Mr. Stanley commits the psychologist's fallacy, I think, in reading the complex formula of 'pain at pain' down into the genetic origins of emotion states. It seems to me that the postulate of simple revival pain, either of direct stimulation or of a reflex kind, would do greater credit to the principle of natural selection and is altogether 'most likely.' The same considerations also apply to emotion-pleasure; we would have to have a formula calling for pleasure at pleasure. Why not say that the revival of cognition pleasure is not always necessary when the object is revived, but that the object-revival tends directly to stimulate the same pleasure that the cognition did?[1]

[1]Mr. Stanley admits a direct lack-pain (pain of unreality, or non-presence)

This requirement is so real, however, that it determines Mr. Stanley's account of desire. He argues for the old hedonistic view, coming now to lay all the emphasis on pleasure (193f). The avoidance of pain is, in the realm of desire, always the pursuit of pleasure.

The complexity that this gives may be pointed out. When a man desires to avoid a painful thing, what he does is this: he pictures the thing, the painfulness of the thing, has 'pain from the pain' of the thing, pictures pleasure from the removal of the 'pain from the pain' of the thing (or would it be the pleasure of the removal simply of the pain of the thing? The former, I think), and, finally, has 'pleasure from the pleasure' of the pictured removal of the 'pain from the pain.' This, to me, is the outcome, in sober truth, of the hedonistic theory when complicated by Mr. Stanley's theory of 'pain from pain' and 'pleasure from pleasure.'[2] And we must add to this the fact, as Mr. Stanley says, that the desire itself is painful. To take a concrete case. Suppose a child crying at the prospect of a cold bath and pleading to be let off. Does he picture the bath in revival, the pain of former baths also in revival, get pain from this pain, picture pleasure from the removal of this pain from the presented or revived pain, and then get sense of pleasure from this pleasure, to prompt his desire?—this last being the end which justifies the hedonistic postulate? Surely all this, or anything like it, is not there. The child has revived symbols of the bath-act, and reflex and associated pain states with them; these latter revive the associated shunning movement and speech tendencies, etc., and the consciousness of these latter is the desire. The *end is* the symbolic bath-act, pure and simple; that fills the child's consciousness up so full and its hedonic quality (not *recognized* mainly but *refelt*) is so utterly unbearable that he bursts out in the associated movements—in this case movements indicating negative, so to speak, rather than positive, desire.

In this difference from Mr. Stanley I have no intention of minimizing the factors involved nor of discounting the real complexity of these higher evolutionary products. It is possible—or, as Mr. Stanley says so often from his introspective points of view, it may be 'most likely'—that the process of genetic acquisition of desire has been more complex than the simple scheme which I have indicated. But we all

in lower organisms. Why should there not be a direct lack-pain at the higher representation level—pain of unreality of object without cognition of 'pleasurableness' of the lacking object?

[2] This on the view that desire is emotion (193); and I have not introduced certain other elements included in Mr. Stanley's scheme of eight factors (208).

recognize the abbreviating processes of evolution and expect the lapsing of links which a chronological order would seem to require; and, on the whole, it seems much simpler to make the original tendencies of action terminate on objects, clinging to the functional or 'index' view of pleasure-pain, and then to keep this object-consciousness forward all the way up the genetic scale. Then in the interpretation of the higher consciousness one may accept the outcome of the overwhelming current of criticism of hedonism. Certainly it is something to avoid the remarkable shifting of emphasis from pain in the original and lower stages, to pleasure in the higher, to which Mr. Stanley has to resort.

There are many interesting topics in the book on which it would be profitable to dwell; but I may only cite summarily certain special teachings of Mr. Stanley which are confirmatory or corrective of views of others, and important: 1. Pain is declared to be 'purely monitory (14)'; this I think contradicts Mr. Stanley's own view that pain is the direct stimulant to 'will-effort;' for if the latter, then the pain must be, as the author seems to teach elsewhere, index of benefit-from-stimulus, which is actual, not prospective only. It has a 'monitory' meaning also, of course. 2. The emphasis of the fact that all mental development is an achievement, 'never a given.' Everything is achieved by struggle, action, effort (23, 29, *et al.*). 3. Confusion arises from the use of the word 'feeling' in three senses: namely, as equal to 'consciousness,' as 'pure' pleasure and pain, and as qualitative emotion. 4. Confusing use of the expression 'quantity of consciousness' to mean area or *Umfang* (55). 5. Very interesting theory of the phylogenetic origin and value of 'unreality-feeling' (85). It is directly confirmed in the life of the infant, as I have argued elsewhere. 6. Unhappy use of the word 'representation' to include recognition (86). 7. Mr. Stanley makes the animal's going-out reactions—*i. e.*, for food, etc.—a late accomplishment, dependent on representation with recognition of object as pleasure-giving. Why is this necessary when the opposite—*i. e.*, the struggle away from the pain-giving object—is organic and primitive? The argument for the latter from natural selection will secure as well an immediate reaction for pleasure-giving stimulations. I have used the same argument for the primitive character of both sorts of reaction (*Mental Development*, p. 173f). 8. Mr. Stanley follows Spencer in making the utility of touch lie largely in the 'circular reaction' function which it exemplifies (193). Why does not natural selection secure this state of things more primitively, so that it is true earlier that 'the edible is no longer fortuitously hit

upon?' 9. The doctrine that all attention is volitional and that all intensity quality in sensation is in its origin volitionally achieved, would be much better expressed by maintaining the current distinction between 'reflex' and voluntary attention, and then adopting some general term like the current 'motor-process' to express the active process of 'achieving' all the way through (228). The confusions into which Wundt has fallen in his doctrines of attention by this same procedure might be a warning against calling the struggle of the amœba away from pain-conditions 'volitional.' 10. Object and subject-cognition are 'coincident in their origin' (252); and since sensation is cognition, all sensation involves self-sense. Mr. Stanley here seems to confuse pleasure and pain values with sense of their value for a self. He is led into it by his doctrine (criticised above) that pleasure-pain is represented as conscious end. 11. The insistance that emotion is *genetically stimulant* to useful activities and not result of them is justified (360); but only on Mr. Stanley's view that emotion is intrinsically pleasure-pain. I can not see any way to avoid this claim that pleasure-pain-feeling is the dynamogenic factor all the way through. 12. Interesting discussion of play (364ff).

I have no space to speak of the author's interesting chapters on Æsthetic and Ethical Emotion. J. M. B.

ETHICAL.

Studies in Character. S. Bryant. New York, Macmillan, 1894. ($1.50.)

Hedonistic Theories from Antippus to Spencer. John Watson. New York, Macmillan, 1895. ($1.75.)

Mrs. Bryant's Essays are grouped under the heads 'Ethical' and 'Educational.' None the less there is a decided unity of method and point of view running through all of them. The ethical essays carry educational implications throughout, and it is the ethical side of education which commands Mrs. Bryant's attention. It is to be hoped that the book will attain a wide reading in the educational community. It is a book that does not shock one's intellectual self-respect, which is more than can be said of many professedly pedagogical treatises; and it utilizes in an unobtrusive, but none the less effective, way very much that is best in current ethical and psychological writings. Mrs. Bryant is at home in what is being said and discovered in the vital places of current discussions—another mark of emi-

nent distinction from much of what passes as pedagogical contributions. Systematic in outer form, being a collection of essays, the book is not; systematic in unity of conception and method the book is, much more so than many more pretentious treatises.

In dealing with such topics as 'My Duty to thy Neighbor,' 'Friendship,' 'Soundness of Intellect,' etc., one perhaps could be brilliant only at the expense of sanity, and original only by leaning towards eccentricity, and the originality of sincerity (which, as Mrs. Bryant quotes Carlyle is the real originality), Mrs. Bryant possesses. However this may be, there is a tendency at times to fall into a certain explicitness of classification and definition that makes long continued reading an impossibility. A few pages are suggestive; two or three chapters of it load one with the feeling of assisting in the laying out of the corpse of the moral universe. As Professor James has remarked about too much descriptive psychology there are many things which it is highly interesting to experience, but a little tedious to be reminded of in too much detail and with too explicit a touch after we have been through them. Perhaps only Aristotle at his best, and the French moral essayists with their capacity for unexpected epigram and their ability to flash upon the reader the ironical reverse of their own definitions, have ever been at home in this region or moral description.

As to the implied ethical doctrine of the book, it is upon the whole, the idealistic interpretation of the conception of self-realization, vitalized for educational purposes with considerable concrete psychology regarding the motor tendencies of ideas and concrete insight into individual temperaments and types. I cannot forbear from pointing out that while in her ethical doctrine Mrs. Bryant conceives the 'ideal' to be perfection located at a remote goal; for practical purposes, she, like all other perfectionists, gets down to approximate ideal, which is the right functioning of present powers, or the relating of conditions of a present situation. The same contradiction occurs when Mrs. Bryant is getting at ideals from a psychological standpoint. The theory implied in practice is so certain to be more adequate than theory set up as theory of practice.

There appears to me also to be a regrettable tendency in Mrs. Bryant to over-emphasize the personal or immediate, direct side of conduct—devotion to persons, whether one's self or somebody else, instead of devotion to work, to action and to persons, whether one's self or others, indirectly through their implications in activity. But so far as there is any concensus of ethical doctrine on this point, I

suppose it is with Mrs. Bryant rather than with the reviewer; and, as the point is too big for discussion in a review, the matter must go as a personal regret and dissent. All this direct moral devotion to persons, I believe can end only in useless complications, weariness of flesh and spirit and contradictions between our aspirations and our accomplishments, both in theory and in practice.

Professor Watson publishes his criticism of hedonism 'as a needful supplement to the ethical part of his [my] Outlines of Philosophy.' His method of criticism is, as indicated in his title, historic. It is historical types, rather than actual historic continuity, however, which Mr. Watson deals with; his authors being Aristippus, Epicurus, Hobbes, Locke, Hume, Bentham, John Stuart Mill and Spencer; about one-fourth of the book being devoted to the last named.

After discussing the influence of the Sophists, Aristippus is considered as the type of naive and, in one sense, the only consistent hedonism—the seizure of the pleasure of the present moment. Professor Watson points out a psychological contradiction contained in the idea of seeking momentary pleasure; *seeking* for pleasure introduces struggle and pain; pleasure as pleasure comes and is enjoyed without being sought. The doctrine is also shown to involve an essential misreading of human nature, ignoring the simple fact of experience that men seek active ends in which undoubtedly they anticipate and find pleasure, rather than pleasure as such. Epicurus enlarges and, in an objective sense, rationalizes the momentary, transitive end of Aristippus in introducing the idea of the greatest pleasure on the whole as an end; but as Professor Watson points out, at the expense of hedonism, virtually substituting a state of contentment for the ideal of pleasure; and contentment, in turn, involves its own peculiar self-contradiction, since to make the attainment of individual contentment the ideal is to throw everything back upon individual temperament, and thus deify lawlessness. Hobbes generalizes the hedonistic conception still further; Aristippus simply ignored the state; Epicurus was for getting along with it with the least possible trouble; Hobbes will turn the whole social organization into a means of bringing pleasure to the individual.[1]

[1] While I hesitate to differ from Prof. Watson on a historical point, this statement as regards Hobbes seems doubtful. Perhaps Hobbes ought in logical consistency to have taken this view; but as matter of fact he seems to me to throw all the emphasis on the *substitution* of the end of the sovereign for that of the individual; and his whole political reasoning to be a back-handed way of saying

Locke represents a consistent inconsistency—a philosophy of compromise. His intentions are good; his performance poor. He intends to assert freedom, but he holds that the strongest uneasiness determines the will, and uneasiness is simply the desire for the pleasure that is strongest. He intends to uphold the objectivity of moral distinctions, and defines the good as that which is conformable to law; but when he states how law lays hold on the individual he falls back on the pleasures got by obedience and the pains suffered through disobedience. Hume is as uncompromising as Locke the reverse. Pleasure is the sole motive, and reason can never be a motive; its sole office is to serve the feelings. With Hume the hedonistic logic may be said to have become explicit and self-conscious. The self being only a bundle of feelings, there is naught but feeling to seek or avoid, or by which to seek or avoid.

With Hume the logical evolution of hedonism ceases; since him we have only recurrences to earlier types, or else its ennobling through the introduction of ideas non-hedonistic in character. Bentham in a way went back to Hobbes, only with great practical interest in social reform which lead him to introduce elements irreconcilable with hedonism, while Stuart Mill can be made consistent only by interpreting his practical views from the standpoint of an idealistic theory. The examination of Mr. Spencer takes up his ethical doctrine both in its hedonistic psychology, its evolutionary aspects and the relation of one of these to the other, with a view to showing that Mr. Spencer's general formula of evolution throws no light on moral conduct; that his psychology destroys the reality of obligation, and does not justify the transition from egoism to altruism; while the idea of a completed life and completed society held up as the goal from the side of evolution have no special coherence with the ideal of pleasure set up on the analytic side.

Philosophic exposition is at its best as to style in this book of Professor Watson's. I could with difficulty name another book which might at once command so thoroughly the respect of the specialist and receive comprehension by the layman as does this lucid, direct piece of exposition and criticism. It may be of service to teachers of ethics to point out that the expositions of the various authors, mainly

that *since* men live in society they must regard the social end before the individual end; and that *if* they lived in a state of nature, while each might then follow his own selfish end, yet such a state would be self-contradictory. In other words, Hobbes' psychology and his sociology contradict each other flagrantly, instead of the latter being an instrument as regards the former.

in the authors' own words, are well proportioned, condensed and accurate, and, in some cases, the best available substitutes for a perusal of the original texts, and in all cases a helpful accompaniment of such perusal.

The book seems to me to close the case, on the polemic side, as regards hedonism. Undoubtedly we shall go on having arguments both for and against hedonism, but the interest seems about done with. The rise of a new psychological method and of a new sociological point of view and body of facts have presented new problems and shifted the focus of attention. These indirect influences have probably done quite as much as more direct criticism in making hedonism a played-out standpoint. Just because Prof. Watson's book has accomplished its task so thoroughly, one lays it down with a feeling of what has not been accomplished, and of what constitutes the next task—the discussion of hedonism from the historic standpoint, in the evolutionary sense. We do not need longer to contend with hedonism as a present foe, and consequently we want to comprehend it more thoroughly as a manifestation—comprehend it not in terms of itself, but in terms of the social and intellectual conditions which have given birth to it, to see what it really means when so interpreted. From the historic evolutionary standpoint, there has been the same inner necessity, in the logic of growth, for the appearance of these hedonistic systems as there has been for that of any transcended animal or political form of life. What is that inner necessity?

JOHN DEWEY.

LESIONS OF THE CORTICAL NERVE CELL IN ALCOHOLISM.

Experimentelle Untersuchungen über die Veränderungen der Ganglienzellen bei der acuten Alcoholvergiftung. HEINRICH DEHIO, Centralbl. für Nervenheilk. u. Psychiat. V. 113–118.

Studies on the Lesions produced by the Action of certain Poisons on the Cortical Nerve Cell. I. Alcohol. HENRY J. BERKLEY. Brain, LXXII. 473–496.

The two articles above mentioned have made an attack upon one of the least worked fields of nervous pathology opened up by the advance of the last few years in the methods of preparing and staining

nerve tissue. The results hardly admit comparison, for while both observers used rabbits for their experiments, and to a certain extent the same method of preparation of sections, Dr. Dehio's subjects were all those of extremely acute alcoholism, the animals having died within 1–36 hours after the first administration of the poison, while Dr. Berkley's had been treated for a much longer time (from five to twelve months), so that the alcoholism had become more or less chronic. What is also to be regretted for comparative purposes is that the German observer confined himself to one method of staining (Nissl's methylene blue), and his observations to Purkinje's cells in the cerebellum, while Dr. Berkley apparently made no observations on these cells with that method, though he employed the Nissl stain on cells of the hemispherical cortex.

Dehio's rabbits were treated in most cases with subcutaneous injections of 40 per cent. alcohol, the first injection being from 7–10 ccm. and the resulting intoxication kept up by injections of 5 ccm. whenever the animal showed signs of recovery. According to the time of intoxication before death resulted the total amount of alcohol administered varied from 20 to 25 ccm. To be brief, there were no changes noted in Purkinje's cells in cases where the ante-mortem intoxication had been very short. When that was longer he found that, instead of the normal finely meshed network of the cell body, the stained substance showed granules irregularly distributed, but of fairly uniform size, while the unstained substance had taken on a light bluish tone. The cell changes in some cases involved the whole cell, in others only a part, while the fine granule rows of the processes appeared always unaffected. The nucleii were unaltered. Even in extensive changes by no means all of the ganglion cells were affected; there were often whole rows of entirely normal cells, while between them lay singly or in groups the pathologically changed.

Dr. Berkley's experiments were much more complete and systematic and had what would seem the additional advantage for the investigation of the comparatively long period of alcoholism before death. The methods of staining which he used were both the Nissl and a modified Golgi-Cajal.

His results showed, besides certain vascular changes, modifications of nerve cells, as follows: By the Nissl method the nucleoli of many of the cortical cells appeared roughened and uneven, and in many cases enlarged and surrounded by a granular appearance. By the method of silver impregnation the principal lesions were distinct diminution in size of a great majority of all the cortical cells, certain

swellings in the dendritic processes with roughening of some of the processes and sometimes of the cell bodies. All the layers of cortical cells seemed to partake of the degeneration to some extent. Owing to the small proportion of cells that are stained at any one time by the silver method, it was impossible to determine even approximately the proportion of normal to abnormal cells.

In the cerebellum Purkinje's cells showed distinct degenerations, but, as already remarked, the difference of method does not allow comparison between Berkley's preparations and those of Dehio. Dr. Berkley promises a subsequent paper upon the lesions in chronic alcoholism in the human subject which will be awaited with interest.

LIVINGSTON FARRAND.

COLUMBIA COLLEGE.

SENILE DEMENTIA.

Ueber Dementia Senilis. Inauguraldissertation, von JEAN NOETZLI, med. pract. Aus der psychiatrischen Klinik des Herrn Prof. Forel in Zürich.

Dr. Noetzli submits 70 cases of senile dementia to a clinical and pathological analysis. Only those patients were selected who died between January 1, 1880, and December 31, 1891, and in whom an autopsy was made. The dissection of the brain was made by Prof. Forel himself in most cases, which secures a very welcome uniformity of the material for comparison. The method used is Meynert's.

N. makes first a rough classification based on the pathological findings. While the changes in the brain are purely degenerative and always accompanied by arteriosclerosis, in one class the patients die with a uniform degeneration of the brain without focal lesions; in the other classes there are moreover circumscribed lesions of a thrombotic or hæmorrhagic nature. This second group is again subdivided into:

A. Cases of Senile Dementia, the focal lesions of which are symptomatically completely latent, or in which focal symptoms appear in the course of the disease or towards the end.

B. Cases of Senile Dementia which set in with apoplexies or other focal symptoms.

Clinically, the cases with focal lesions are marked with rapidly progressing dementia and transitory melancholy or maniacal periods of excitement, while typical senile melancholia and senile 'mania persecutoria' belong almost exclusively to the group without focal lesions.

Etiologically, N. states with Forel that the heredity of a disposition to atheroma of the blood vessels may be more important than a her-

edity of mental diseases (Fürstner), but that the quiet forms of Senile Dementia seen in the poorhouses or asylums for old people would be cases without disposition to (positive) insanity, whereas those predisposed to insanity will show the symptoms of senile mania and senile 'mania persecutoria.' This is, however, not proven, because no special attention is given to the question in the records. Changes in the material life of the patients, especially physical infirmity and diseases, are very prominent elements, not only where they lead to senile hypochondria; psychical influences play decidedly a part in many of those predisposed to insanity, contrary to the view of Fürstner, who states that as a rule the victim of senile dementia is dull towards psychical impressions. Further, Forel makes a special group of Dementia alcoholico-senilis, which seems to be very frequent in Switzerland.

Symptomatology: 'Senile' psychoses are, as a rule, distinguished by a prodromal stage, with loss of memory, change in character, and slight intellectual and ethical defects.

Senile mania lacks the breadth of ideation, the acuteness of judgment, the wit and the flight of ideas of typical mania; it is rather loquacity with senseless, impulsive actions and confusion especially as to time and place. Emotions are superficial.

Senile melancholia: In his cases, N. finds no delusions of self-belittlement (on account of the weakness of ethical and moral processes); anxiety and fear are apt to cause raptus and unexpected attempts at suicide; hypochondriacal symptoms are prominent.

Senile 'mania persecutoria' or Verfolgungswahnsinn are very often based on hallucinations and most marked at night; these are, however, primordial deliria of persecution.

The alcoholico-senile Dementia shows strong manifestations of chronic alcoholism; its outset is relatively premature; at a very early stage the patients commit suddenly impulsive acts on their relations; hallucinations are frequent and characteristic for alcoholism, but the dementia modifies the whole symptom complex of alcoholism.

The 70 cases are classified as follows;

I. Senile psychoses without focal lesions 40
  (a) Senile mania 6
  (b) Senile melancholia..... 10
  (c) Senile 'mania persecutoria'..... 4
  (d) Senile hypochondria 1
  (e) Dementia alcoholico-senilis 6
  (f) Typical simple senile dementia 13
II. Senile psychoses with focal lesions 30

A. Cases of senile dementia with focal lesions, which were latent or secondary—15:

(a) Senile mania.....—
(b) Senile melancholia 3
(c) Senile mania persecutoria..... 2
(d) Dementia alcoholico-senilis 1
(e) Typical senile dementia 9

B. Cases of senile dementia setting in with apoplexies or with other focal symptoms—15:

(a) Senile mania..... 1
(b) Senile mania persecutoria..... 2
(c) Dementia alcoholico-senilis 2
(d) Typical senile dementia 10

The very important study of the brain weights cannot be given in detail here. The chief results are that the decrease of weight averages 200 grammes, the average weight in men being 1,190, in women 1,065 grammes. The brain mantle loses most in weight, but, contrary to the view of Meynert, the loss is not greater in the frontal lobe than in the occipital or temporal lobe. ADOLF MEYER.

WORCESTER, MASS.

HYPNOTISM.

Ueber Schlaf, Hypnose und Somnambulismus. MAX HIRSCH. Deutsche med. Wochenschrift. 5 Sept. 1895.

The above essay offers, according to the author, a partial solution of the question whether hypnotic and normal sleep are identical, or whether these two conditions must be considered as differing from each other. In his manual 'Suggestion und Hypnose' (Leipzig, 1893) the author expresses himself of the latter opinion; hypnosis he here considers merely as a sleep illusion. Influenced by new observations, he now announces a modification of this view. He could observe that 10 per cent. of all persons hypnotized by him fell at the first attempt into the deepest state of hypnosis, which term the author applies to that condition in which all hypnotic phenomena may easily be produced and with which loss of memory is always connected. The author further observed that the same persons likewise show a certain peculiarity with respect to their normal sleep. They can fall asleep when and where they wish. Rapport is also present in these persons during sleep. As the sleep of these persons completely resembles the

condition of hypnosis, the author designates it as 'somnambulic sleep,' but he leaves it undecided whether this sleep is or is not a pathological condition, although in a number of people of neuropathic tendency it represents a species of sleep. Those somnambulists, however, in whom the representations during sleep develop into actions are designated as undoubtedly pathological. Although Hirsch still maintains the opinion that hypnosis is *in general* a sleep illusion, he designates, on the other hand, the hypnosis and sleep of somnambulists as identical. "Hypnosis is in them somnambulic sleep." The author explains these phenomena as arising from the different degrees of attention. In normal sleep the attention is, in his opinion, diffused over all centers of represention; in this condition it is incapable of concentration; in somnambulic sleep, on the contrary, the attention retains the power of diverting itself to single representations. Thus the attention of these persons need only be diverted towards the representation of sleep in order to cause them at once to fall asleep.

I should like in this place to make mention of the investigations by which Dr. Oscar Vogt has endeavored to decide the present question, and which he will shortly publish in the 'Zeitschrift für Hypnotismus, etc,' edited by him. So far as I am acquainted with these interesting researches I am enabled to communicate the following facts. In comparing the graphically fixed attendant phenomena of hypnotic and normal sleep Dr. Vogt comes to the conclusion that there are here many individual differences, but that these attendant phenomena are identical in one and the same individual. Vogt further states that in all normal sleep there is a certain stage which admits of rapport as in hypnosis and that, if this moment is not missed during the falling asleep of a person, he may be treated precisely as a hypnotized subject. Vogt adheres therefore to the school of Nancy and maintains, contrary to the view taken by M. Hirsch, the complete identity of natural and so-called hypnotic sleep.

LEIPZIG. FRIEDRICH KIESOW.

Criminelle hypnotische Suggestionen. DR. A. A. LIÉBAULT. Zeitschrift für Hypnotismus. Bd. III. Hefte 7, 8, 9.

The author advocates the possibility of hypnotic and post-hypnotic criminal suggestions by presenting facts of history, analogies between sleeping and waking states, and incidents of his own experience. Dr. Durand de Gros, who wrote 'Electro-dynamisme vital' (1855), believed himself able to transform moral character and wrote to the Spanish Court for permission to operate on Manuel Blanco, who,

under the conviction that he was a wolf, killed six men and actually ate parts of the bodies. The middle ages produced numerous cases of this kind under the name 'Warwolfe.' They are men who reflect upon and admire one action or type of action till they finally merge their own personalities into a submission to it from which neither reflection nor volition can free them. A lunatic who believed himself a general and dressed in uniform might just as well have been a Warwolf. A little girl of nine or ten years was freed by hypnotic sittings from the illusion that she was a dog and from habits of lying by the door, barking at visitors, running on all fours. Later the girl's grandmother asked the author to free the girl's father from a low passion for his child. Still later a neighbor's daughter reported to her parents that the man had misconducted himself toward her. He was imprisoned for life. Author believes the father had already suggested to his own child that she was a pup.

Fixing the attention on the key-note of hypnotism, sleep, the fixed idea of rest, why may not one become subject to personal influences as completely as in cases of fascination where persons are often brought to violate conviction and habitual sentiment? Certain signs of sleep in waking state are physiological and pathological hallucinations, impulsive actions, fixed ideas, as that one cannot swallow something bitter, etc. Signs of wakefulness in sleep are writing poems, solving problems, recognition of approaching danger, consciousness of the passing of time, recognizing the stopping of a clock, etc. From 4 per cent. to 5 per cent. of subjects have by the author been brought to perform what would have been terrible crimes had they been real. Automatic sleep-suggestions have led to crimes in waking state in three cases. Author mentions Jacques Clément, who believed an angel commanded him, in sleep, to murder the King of France; also of Friedrich Staaps, who attempted the murder of Napoleon I., because convinced of a divine commission to do so. Liégeois and the author saw a subject choose a suggested watch instead of his real one for his own, proving that suggestion is real.

The author asserts that anyone in artificial sleep can be brought to perform any crime in which he is able to participate without waking in dreams. The author holds that only somnambulists—'and they are but few, as one sees'—are capable of carrying out these crimes. Those who fail to get criminal suggestions carried out choose subjects without premeditation. The author relates the case of somnambulist N. Dr. X. and the author suggested to N., in artificial sleep, that he would visit Herrn F. at his home on the next morning at 11:30, and

in leaving the house would conceal two statuettes near the door under his mantle; after two days N. would regret his theft and return the pieces of art. Dr. X. repeated to N.: "and you will steal, do you hear? You will steal!" Later Herr F. related the event as having been caried out in every particular. Later still, N. was imprisoned for stealing an overcoat. On his person was found a note-book recording many small thefts, such as visiting cards. The author felt himself possibly to blame. Much later when N., who was at the time of the theft 17 or 18, had grown (N.'s father forbade it sooner) the author again hypnotized N., and learned that at the same time when the boy committed the theft which ended in imprisonment, Dr. X. had met him on the street, lead him into a café, hypnotized and commanded him to steal 'little things,' such as watches, gloves, money cases and probably visiting cards. GUY TAWNEY.

LEIPZIG.

VISION.

Note on the Analysis of Contrast-Colors by Viewing, through a reflecting tube, a Series of grey disks or rings, on colored surfaces. A. M. MAYER. Am. Jour. of Science. (4) I., 38–40. 1895.

Article (Vision) in Johnson's Universal Cyclopædia. W. LE CONTE STEVENS.

Untersuchungen zur Lehre vom Farbensinn. W. KOSTER. Arch. f. Ophth. 41 (4) 1–20.

Théorie de la Coleur. W. NICATI. Arch. d'Ophtal. XI., 1–44. 1895.

From the fact that a dark grey background is most effective when yellow contrast-color is to be produced, and a light grey when the color to be produced is green, Professor Mayer argued that a yellow-green contrast-color would change its tone with a change in the intensity of the background. He found this to be the case. Bits of violet paper were placed on thirteen different shades of grey; on the four lightest, the contrast-color was a greenish yellow; on the fifth, it was equally yellow and green; and on the darker papers it became greener and greener until at last it was a green almost devoid of yellow. But Professor Mayer considers that this *may* be due to the fact, noticed by Professor Rood, that some colors regularly change their tone on being mixed with larger and larger amounts of black.

Professor Stevens has given what must be considered as an admirably clear account of the principal phenomena of vision, when regard is had to the small space into which it had to be condensed. He makes short work of the bugbear of the inverted image, and he shows that the contest between the empirical and the nativistic school loses its importance in the light of evolution. Attention is given to some of the new facts of color-vision; but it is an inadvertence to say that the cones are sensitive to variations of color chiefly. The correct statement would be that *only the cones* are sensitive to variations of color; they must be extremely sensitive to variations of intensity in white light as well,—otherwise the fovea would not be the place with which we make out the minutest variations of line and shade in an intricate drawing. If the *cones only* give color, they do not give *color only*. Every new and adequate theory of vision must make provision for this fact; but, strange to say, it has been overlooked by no mean authorities.

I must protest also against saying that the physicists are satisfied with Helmholtz's theory of vision, with the implication that that is a fact of critical importance. The physicists have nothing to do with a theory as to what goes on in the retina and in the brain—that is beyond their province. It would be as much to the point if the chemists were to announce that they were perfectly satisfied with the corpuscular theory of light. As matter of fact, the objections to the theory of Helmholtz are exclusively objections from the side of sensation; as far as the physics of the question is concerned, there is nothing in the theory that anyone could take exception to. And when it is a matter of discussing light as a *sensation*, we do not so much say that the physicists are not in the habit of thinking about their sensations, pure and simple, as that they are not in the habit of reading up the discussion that is going on regarding sensation. Professor Cattell has said he best word that has been said about the Helmholtz theory when he said that it is both pre-evolutionary and pre-psychological; the arguments that hold good against it are not only arguments that appeal with especial force to the physiologist and the psychologist, but they are arguments that have been debated in Pflüger's *Archivs* and the *Zeitschrift für Psychologie u. Physiologie der Sinnesorgane* and other journals of that kind, which the physicists, overwhelmed as they are by their own journals, have no time to read. Even the critical facts, of late discovery, do not always reach them. Captain Abney, in his last book on *Color Vision*, says of a certain man, who had no variation of sensation throughout the entire spectrum, that it has been

'proved' that he sees green only. Now if a man has no other light sensation with which to compare his one sensation, it is absolutely impossible for us ever to find out what that one sensation is, unless by way of deduction from a theory which is taken as proved. But, fortunately for such cases as this, there have been instances of monocular total color-blindness, and from them it is known that the single sensation is a colorless sensation. Moreover, we have ourselves this monotone sensation in the periphery and throughout the retina in a faint light, and one must have a very strong preconceived affection for a theory to regard this sensation as green, though this, too, is a feat that has been accomplished. I have been told that there is one important university in this country in which the theories of Helmholtz and Hering have both been definitely given up, and particularly in the physical department.

Koster explains the fact that the fovea lags behind the periphery in sensitiveness to faint light by the fact that it is generally, on account of its position with respect to pupil and lens, more brightly lighted up, and hence, if I understand him, in a condition of greater exhaustion. He forgets that in a faint light also the fovea has the same advantage of position, and that the superiority of the periphery is on this account greater than a simple measurement gives evidence of. For Koster's eyes the difference would seem to be very slight; if this is so his eyes differ most remarkably from those of other observers who have measured the phenomenon. He uses the term periphery without any indication as to what part of it he is comparing with the fovea. The maximum sensitiveness is about 35° away from the fovea, and it is true that at distances remote from this the superiority is not extremely great, but at this distanee it is, for most eyes, as four to one, which is hardly to be called slight. He seems to have made no measurements.

Koster finds the Pürkinje phenomenon to persist, under certain conditions, in the fovea itself; this does not, however, disprove the belief that the visual purple is the principal factor in the adaptation which the rods undergo. The cones have a means of adaptation of their own in the varying length of their myoids under light and shade (Angelucci, van Genderen Stort), and also in the moving out and in of the pigment grains. This might also account for a superiority of the edge of the fovea over its centre, which Koster detects. That the adapted eye sees colors less well than the unadapted, Koster finds not to be the case. This agrees with my own observations; I found, in fact, that there is a distinct adaptation for color, though nothing like so much as for light, in the middle periphery.

Nicati uses the term color for the entire sensation produced by light, as painters speak of the color, sometimes, of a picture in black and white. By protochroism he means grey vision; by metachroism, partial color blindness; and by pleochroism, normal vision. He gives a theory which, he says, will seem at once to be plausible, and which will be confirmed by all the considerations which he will have mentioned at the end. In the rods and cones, he says, there is no differentiation such as could give rise to *three* colors, but in the central terminations of the bipolar cells, as described by Ramon Y. Cajal, we have just the separation into *three* layers, which we are in search of as a basis for a three-color theory. The chemical effect of light on the photopsine (the visual purple) is to disengage electricity; the different threads of the bi-polar cells have different electric resistance, and thus the electricity is conducted, according to its varying degrees of strength, by one or another of the sets of threads to the several layers of their terminal expansions. (But is not this a little like making a big door for a cat and a little door for a kitten? What prevents the strong current from going also through the path which is fitted to conduct the weak current?) The synoptoblasts are the large ganglia below the bi-polar cells, and their function is to restore equilibrium, after red has been seen, by sending down a discharge which results in green.

C. LADD FRANKLIN.

EXPERIMENTAL.

Ueber den Einfluss von Gesichts-Associationen auf die Raumwahrnehmungen der Haut. MISS M. F. WASHBURN. Philosophische Studien. Bd. XI. (1895), pp. 190–225.

The development of tactual space is undoubtedly influenced by vision and, though the assertion of this article that the fact has entirely escaped the notice of previous investigators, with the one exception of Weber, who mentions it only in a negative way, called for a correction in a note by the editor, yet a series of experiments such as Miss Washburn has made serves to emphasize an important truth. Results obtained from subjects who visualized but little, from others who are able at will to abstract from their otherwise vivid visual images, and finally from one blind subject are compared with normal results in which the images immediately arising when the skin is touched are allowed to play their usual part. In this way it is shown that Camerer's subjects in his experiments on the method of equivalents

used visual images as a means of estimating the lengths of the two distances and that his results are to be interpreted in the light of this hypothesis. The well-known observations that the threshold on the extremities is shorter in the transverse than in the longitudinal axis is corroborated only in the case of good visualizers. For poor visualizers the difference does not appear, and for the blind subject the ordinary relation was completely reversed. These observations are to be explained on the ground that the narrower, transverse axis is more easily and clearly visualized. The rapid lowering of the threshold through training, as reported by Volkmann, does not appear when the influence of vision is eliminated. The author thinks the fact that the earlier investigations were carried out with open eyes accounts for the reduction of the threshold. The judgment of direction of continuous stimuli or of the relative direction of two points from one another is dependent to a large extent on visual images as shown by the fact that this judgment is most accurate in the care of good visualizers. In making these experiments the facts were noted that, in general, two points can be distinguished before their relative direction is correctly perceived and that the direction of continuous stimuli is judged better than that of an equal extent lying between the two points of the æsthæsiometer. CHAS. H. JUDD.

LEIPZIG.

On the Development of Visual Perception and Attention. HAROLD GRIFFING, Ph. D. American Journal of Psychology, Vol. VII., 227–236. Jan., 1896.

Several series of letters were exposed through an opening in a screen before a group of persons. In the first experiment six letters arranged so as to avoid suggesting words as much as possible were exposed at a time for $\frac{1}{10}$ second and for ten successive times. The intervals between the several exposures and the warning signals were varied and the observers were without knowledge when they might expect the signal. The observers were examined in groups of ten to thirty, representing all ages from seven to twenty years. The observers fixed their attention upon the opening in the screen until the warning signal was given, and after the exposure they wrote down the letters which they thought they saw. Tables are given showing the results arranged according to age and grade in school. From these "it is evident that the extensive threshold, or ability to receive and retain a number of simultaneous retinal impressions, is a function of individual growth, reaching its maximum only when the observer is fully devel-

oped." "Practice increases the extensive threshold * * *" "The tendency to guess seems to decrease with maturity." The intellectual capacity as judged by the teachers was compared with these results. The brightest pupils showed the highest averages, with some notable exceptions. Those pupils who marked high in attention generally excelled others. The girls showed no superiority over the boys. Better results were obtained when the exposure followed the warning signal by a long interval. Children may experience abnormal fatigue "without any marked effect upon the accuracy of perception." In recalling the letters we "see the given stimuli as a unit and then analyze this unit into its components." When only one letter was exposed the older pupils again excelled the younger; the results were respectively seven errors in 230 observations and twenty-eight errors in 160 observations. When six colors were used in the place of the six letters the results were apparently the same. When the exposure was made for a full second, there was a greater percentage of correct answers, the older pupils showing the higher percentages. "The extensive threshold does not measure the number of objects that can be simultaneously grasped by consciousness;" it "may depend upon the reproductive processes, and the analysis of the memory image," and "to some extent upon the attention." The 'capacity for attention' is to be distinguished from the powers of the attention.

The paper has great significance for psychology and for the practical teacher who has to do with the marking and promotion of pupils. The results are conclusive against the absolute value of a system of examinations. It is well to bear in mind in regard to the extensive threshold increasing with age that in our schools a process of selection is going on all the time. Many of the poorer pupils drop out before they reach the higher grades and the dull pupils are frequently cases of slow development; they show their brightness at a later period. The personal element enters into a teacher's estimation of pupils and this may explain some exceptions. In the last experiment we are not told whether different series of letters were used, or whether other pupils were experimented upon. Unconscious memory in the one case and practice in the other may play some part, as I have found in some of my experiments, to which the author refers in a note.

T. L. BOLTON.

CONSCIOUSNESS.

Zur Kritik des Seelenbegriffs: einige Bemerkungen beim Studium der Wundt'schen Psychologie. ALLEN VANNÉRUS. Archiv für System. Philosophie, Bd. I. Heft 3,360–400. 1895.

Wundt rightly maintains, says his critic, that the subject of psychology, from the psychological point of view, exists in the activity of the psychical process and not as a substance lying back of it. But his opposition to the theory of a substantial soul rests on a restricted conception of substance, which need denote no more than the real ground for determinations not absolutely independent or be more than an abstractly conceived factor in a continuously changing whole. And his denial of the applicability of the conception to inner reality on the ground that the latter is reality at first hand, and therefore not constituted by a category which is its own product, rests on a mistake as to the facts. For only an actual content of consciousness is directly intuited, whereas other aspects of psychical reality, the fusion of sensations, for instance, can only be inferred. Wundt's emphasis of the process in mental life seriously threatens its real unity. But change without permanence is impossible. It is psychologically impossible because the relating activities of consciousness presuppose at least a relatively permanent subject, and because, without some constancy in the subject, not only would all mental states eventually pass into nothingness, but, except by a miracle, no mental state could ever arise. Logically, again, all activity implies a constant factor; otherwise reality is 'a hideous mystery of limitless possibilities.' Finally, the theory of parallelism requires an original psychical reality as the subject of the development of consciousness and the basis of its various modes. This original psychic basis of mental life is constant, not as a substance 'lying back' of experience, but in the sense that it is self-identical in its different functions. Wundt, however, makes the unity of the mental life consist in the connection of the psychical events themselves. But if these events are not functions of the same subject, how is such connection possible? We must postulate their creation *ex nihilo* and assume as many egos as states of consciousness. The truth about the soul is that it is a living, organic unity. The psychical life is a single undivided whole and itself the real unitary subject. This concrete living self consists in given ideas, feelings and volitions and the activity by which these functions are conditioned; the whole, however, is unified by a factor which in itself is the abstract ego and from the empiri-

cal point of view one side of that psychophysical substance in which Wundt finds the substrate and basis of the soul's unity.

Wundt's reply to this argumentation in the current number of the 'Philosophische Studien' (XII., 37 ff.) is to the effect that his critic has not sufficiently grasped the distinction between physical science and psychology, according to which the latter is science of experience as immediately given, whereas the standpoint of the former requires it to deal with objects constructed by thought. Consequently a physical hypothesis is tested by its utility, a psychological by fact, and the fact is that no other unity is found or required in the psychical life except that which exists in the connection of its processes. This is singularly unsympathetic and avoids the real issue. The real question is, Is there discoverable, whether by direct inspection or by reflection, in the movement of our subjective experience, any constant factor? Is the psychical life like a stream which simply flows on or is it a process of self-development? Sameness without change is asserted by nobody; change with the sense of sameness is a fact. Is the sameness predicated really there? That is the real question, as James puts it. Theories of 'actuality' and 'substantiality' are altogether subordinate, mere names. And the question is not to be set aside by the arbitrary distinction of hypothesis of fact and hypothesis of utility nor referred for answer to such irrelevant illustrations as Kant's elastic balls, which, if they were conscious, would be obliged to suppose, as we are, that they themselves were the subjects of experiences referred to the past but appropriated by the present self, whose identity with the past self would be, if illusion, then a necessary illusion.

H. N. GARDINER.

Le Moi des Mourants. V. EGGER. Revue Philosophique, XLI., 26–38. Jan. 1896.

Many persons who have survived an accident that seemed to be fatal report that at the time their whole past life came up before them. This experience, which is not, however, to be taken literally, M. Egger is disposed to connect, not with pathological exaltations of memory in epileptics, etc., but with quite normal phenomena. Noticing that children apparently do not have the experience, he refers to the aggregation of memories with which the ego is continually being constituted from youth to age, and which is particularly marked in the aged, and the fact that the civilized adult about to die and capable of reflection normally realizes his personality in a form vivid and significant. But with regard to their experiences we want more evidence. The

author therefore suggests a systematic enquiry among persons who have faced what seemed to them certain death.

Arrested Mentation. G. FERRERO. The Monist, Vol. 6, 60–75. October, 1895.

It is a natural law of 'unconscious' reasoning, that is, reasoning not consciously guided by the ideals of strict logic (Aristotle and Mill), that it stops short in its explanation of phenomena with what is revealed directly to the senses and neglects factors which can only be discovered by reflection and comparison. This species of 'arrested mentation' explains various popular errors and suggests the possibility of a new science, positive logic, the study of the laws of human reason according to age, intellectual development and the state of civilization. Another more radical species involves the abolition of all observation. This is *a priori* reasoning. Mentation is here arrested because the deductive method merely draws a conclusion from a premise and consequently involves far fewer mental elements and less effort than the inductive.

In his grasp of the facts and the psychology of the so-called deductive method, historically considered, as well as in his general appreciation of logical process, the author seems to furnish a good illustration of his subject.

SMITH COLLEGE. H. N. GARDINER.

THE PSYCHOLOGY OF RHETORIC.

Figures of Rhetoric: A Psychological Study. GERTRUDE BUCK. No. I. of Contributions to Rhetorical Theory. Edited by F. N. SCOTT. University of Michigan. 1895.

This monograph endeavors to state in psychological terms the process by which rhetorical figures come into being. While a concept is seen to be the verification of two or more percepts, which verification, when complete, is expressed in language by a name, there are obviously sentences that express implicit rather than explicit relationships. These sentences, representing an incomplete verification, are 'figurative.' 'Radical' figures occur when the verifying relation between the two objects has not yet been constructed in the mind of the speaker or writer; 'poetical' figures when the relation is at last partially explicit in his consciousness. The ordinary classifications of rhetorical figures could be simplified by making merely two groups; those in

which stress is laid respectively upon the stages of verification and of discrimination. This theory that a figure of speech is an organized complex of mental activities whose implicit verifying principle comes to be more or less explicit in the mind of the reader or hearer, is then applied to the problem of the nature of the pleasurable effect arising from the use of figurative language, and to the question of humor, the writer contending that the perception of the ludicrous and the recognition of a figure of speech are processes essentially one. A carefully compiled bibliography of figures is appended.

The Æsthetics of Words. L. A. SHERMAN. *The Northwestern Journal of Education.* Sept., Oct., Nov., Dec., 1895.

Professor Sherman's series of articles is thus far devoted to the exposition, largely by graphical methods, of the varying 'values' of words for artistic purposes. Words are signs of emotion as well as signs of ideas, and their emotional meaning cannot be told by logical definition. As a preparation for the study of poetry, pupils should be taught to distinguish between conceptual words, which occupy the mind more with knowing than with feeling, and experiential words, in which knowing is merged in feeling. These emotional and suggestive words, depending for their power upon reminiscences or sometimes upon anticipated experiences, stand thus in the closest relation to things. The æsthetics of things depends on the types or ideals of ultimate truth or beauty which they evolve or evince. Ideas, and words as the signs of ideas, satisfy us in proportion to their power to fulfil our types. Those words only should be called 'poetic' which stand for things absolute in their truth or beauty. Professor Sherman's theory of types will not be acceptable to all, but readers of his *Analytics of Literature* will welcome the interesting and acute discussion contained in these articles.

BLISS PERRY.
PRINCETON.

NEW BOOKS.

Child and Childhood in Folk Thought. ALEXANDER FRANCIS CHAMBERLAIN. New York and London, Macmillan & Co. 1896. Pp. x+464. $3.00.

The Number Concept—Its Origin and Development. LEVI LEONARD CONANT. New York and London, Macmillan & Co. 1896. Pp. vi+218. $2.00.

La théorie platonicienne des sciences. ÉLIE HALÉVY. Paris, Alcan. Pp. xl+378.

Die Spiele der Thiere. KARL GROOS. Jena, Gustav Fischer. 1896. Pp. ix+359. M. 6.

Manueli di Semijotica delle Malattie mentali. E. MORSELLI. Vol. II. Esame psicologico degli alienati. With 77 illustrations and 13 tables. Milan, Vallardi. 1895. Pp. xviii+852. L. 15.

I Sogni e il Sonno nell' Isterismo e nella Epilessia. S. DE SANCTIS. Rome, Società Editrice Dante Alighieri. 1896. Pp. 216. L. 2.

The Theory of Social Forces. S. N. PATTEN. Supp. to Annals of the Amer. Acad. of Polit. and Social Science. Philadelphia, Amer. Acad. 1896. Pp. 151.

Evolution in Art. A. C. HADDON. London, Walter Scott; New York, Scribners. 1895. Pp. xviii+364. $1.25.

Studies in Childhood. JAMES SULLY. New York, D. Appleton & Co. 1896. Pp. viii+527.

Die Hauptpunkte der Hum'schen Erkenntnislehre. ERNST PETZHOLTZ. Berlin, Gustav Schade. 1895. Pp. 44.

Die Erkenntnisstheorien bei Leibniz und Kant. LOTHAR VOLZ. Rostock, Universitäts-Buchdruckerei. 1895. Pp. 70.

Movement. E. J. MAREY. New York, D. Appleton & Co. 1895. Pp. xv+322. $1.75.

Die Lehre von den spezifischen Sinnesenergien. R. WEINMANN. Hamburg and Leipzig, Voss. 1895. Pp. 96. M. 2.50.

NOTES.

THE THIRD INTERNATIONAL CONGRESS OF PSYCHOLOGY.

The opening of the Congress will take place on the morning of August 4th, 1896, in the great 'Aula' of the Royal University.

All psychologists and all educated persons who desire to further the progress of psychology and to foster personal relations among the students of psychology in different nations are invited to take part in the meetings of the Congress. Women will have the same rights as men.

Those who propose (1) to offer papers or addresses or (2) generally to take part in the Congress are requested to fill up the accompanying forms and to send them to the Secretary before the beginning of the Congress.

The subscription to be paid by those desiring to take part in the Congress is 15 M. On receipt of this sum a card will be sent to every member entitling him to attend all the meetings and to receive the Journal, *Tageblatt*, issued daily (with a register of the members) and one copy of the Report of the Congress. The card also admits to all festivities arranged in connection with the Congress and all special privileges granted to its members.

The *Tageblatt*, which will appear in four numbers, will serve to register the guests and contain information as to accommodation, the programme of the papers and addresses and social arrangements, the list of members and a short notice of the places of interest in Munich.

The languages used at the Congress may be German, French, English and Italian.

The Congress will perform its work in general and sectional meetings. The division of the sections will be arranged according to the papers and addresses which may be offered. The meetings take place at the Royal University.

The length of the papers or addresses of the sectional meetings is limited to 20 minutes. It is hoped that any member who takes part in the discussion will, to insure a correct report of his speech, give the chief points of it (on a form which will be provided) either during or at the close of the meeting.

Any psychologist who offers a paper or address is requested to send to the Secretary before the beginning of the Congress a short written abstract of its contents. These abstracts will be printed and distributed amongst the audience, so that the different languages used at the Congress may be better understood.

Those members of the local committee who are mentioned in the programme below will all give information as to their respective departments of work and also in connection with the inspection of scien tific institutes and demonstrations.

The Congress will meet in Sections as follows:

I. Psychophysiology.—Prof. Rüdinger, Prof. Graetz, Privatdocent Dr. Cremer will give all information concerning this part of the programme.

a. Anatomy and Physiology of the brain and of the sense-organs (somatic basis of psychical life).

Development of nerve-centres; theory of localization and of neurons, paths of association and structure of the brain.

Psychical functions of the central parts; reflexes, automatism, innervation, specific energies.

b. Psychophysics. Connection between physical and psychical processes; psychophysical methods; the law of Fechner. Physiology of the senses (muscular and cutaneous sensibility, audition, light-perception, audition colorée); psychical effects of certain agents (medicines). Reaction-times. Measurement of vegetative reactions (inspiration, pulse, muscle-fatigue).

II. Psychology of the Normal Individual.—Prof. Lipps, Privatdocent Dr. Cornelius, Dr. Weinmann will give all information concerning this part of the programme.

Scope, methods and resources of Psychology. Observation and experiment. Psychology of sensations. Sensation and idea, memory and reproduction. Laws of association, fusion of ideas. Consciousness and unconsciousness, attention, habit, expectation, exercise. Perception of space (by sight, by touch, by the other senses); consciousness of depth-dimension, optical illusions. Perception of time.

Theory of Knowledge. Imagination. Theory of feeling. Feeling and sensation. Sensuous, æsthetic, ethical and logical feeling. Emotions. Laws of feeling.—Theory of will. Feeling of willing and voluntary action. Expressive moments. Facts of ethics.—Self-consciousness. Development of personality. Individual differences.

Hypnotism, theory of suggestion, normal sleep, dreams.—Psychical automatism.—Suggestion in relation to pædagogics and criminality; pædagogical psychology.

III. Psychopathology.—Prof. Dr. Grashey, Dr. Frhr. v. Schrenck-Notzing, Edm. Parish will give all information on this part of the programme.

Heredity in Psychopathology; Statistics.—Can acquired qualities be transferred by inheritance?—Psychical relations (somatic and psychic heredity), phenomena of degeneration, psychopathic inferiority (insane temperament).—Genius and degeneration; moral and social importance of heredity.

Psychology in relation to criminality and jurisprudence.

Psychopathology of the sexual sensations.

Functional nerve disease (hysteria and epilepsy).

Alternating consciousness; psychical infection; the pathological side of hypnotism; pathological states of sleep.

Psychotherapy and suggestive treatment.

Cognate phenomena; mental suggestion, telepathy, transposition of senses; international statistics of hallucinations.

Hallucinations and illusions; imperative ideas, aphasia and similar pathological phenomena.

IV. Comparative Psychology.—Prof. Dr. Ranke, Dr. G. Hirth, Dr. Fogt will give all information in this department.

Moral statistics.

The psychical life of the child.

The psychical functions of animals.

Ethnographical and anthropological psychology.

Comparative psychology of languages; graphology.

Prof. Dr. Lipps, Georgenstrasse $18/_1$, is Committee of Reception, and Dr. Frhr. von Schrenck-Notzing, prakt. Arzt, Max Josephstr. $2/_1$, is General Secretary.

The International Committee of Organization is as follows;

President: Prof. Dr. Stumpf, member of the "Akademie der Wissenschaften," Berlin W., Nürnbergerstrasse 14; Vice-President: Prof. Dr. Lipps, München, Georgenstrasse $18/_1$. General Secretary: Dr. Frhr. von Schrenck-Notzing, prakt. Arzt, München, Max-Josephstrasse $2/_1$. Members of the committee: Prof. Bain, Aberdeen, Scotland. Prof. Baldwin, Princeton University, New Jersey, U. S. A. Prof. Bernheim, Nancy, hôpital civil, France. Prof. Delboeuf, Brussels, Belgium. Prof. H. H. Donaldson, Chicago, Ill., U. S. A. Prof. Ebbinghaus, Breslau, Germany. Prof. Ferrier, Cavendish Square, 34, London W., England. Prof. G. S. Fullerton, 116 Spruce street, Philadelphia, Pa., U. S. A. Prof. Stanley Hall, Clark University, Worcester, Mass., U. S. A. Prof. Hitzig, Halle, Germany. Prof. James, Cambridge, Mass., 95 Irving street, U. S. A. Prof. Lehmann, Kopenhagen, Hagelsgade 7, Denmark. Prof. Liégeois, Nancy, France. Prof. Lightner Witmer, University of Pennsylvania, Philadelphia, Pa., U. S. A. Prof. Mendelssohn, Petersburg, Möika 81, Russia. Prof. von Monakow, Zürich, Stadelhoferstr 10, Switzerland. Prof. Morselli, Genova, via Assarotti 46, Italia. Mr. F. W. H. Myers, Deckhampton House, Cambridge, England. Dr. Newbold, University of Pennsylvania, Philadelphia, Pa., U. S. A. Prof. Preyer, Villa Panorama, Wiesbaden, Germany. Prof. Richet,

rue de l'Université 15, Paris, France. Prof. Schäfer, University College, Gower street, W. C. London, England. Prof. Sidgwick, Newnham College, Cambridge, England. Prof. Sully, Hampstead, N. W., East Heath Road, London, England. Dr. Ward, Selwyn Gardens, Cambridge, England.

THE *Année Psychologique* for 1895 will contain, in addition to analyses of psychological literature, and the Bibliography for 1895, prepared by Dr. Farrand and Prof. Warren for this REVIEW, the following original articles:

1. Ribot, Les caractères anormaux et morbides. 2. Binet et Courtier, Etude des vasomoteurs dans leur rapport avec l'ètat intellectuel, des émotions, etc. 3. Bourdon, Expériences sur les associations d'idées. 4. Flournoy, Temps de lecture et d'oubli. 5. Biervliet, Illusions de poids. 6. Forel, L'instinct des fourmis. 7. Nilliez, La mémoire des chiffres. 8. Henri, La localisation des sensations du toucher. 9. Binet, La peur chez les enfants. 10. Binet et Courtier, Recherches graphiques sur la musique. 11. Binet et Courtier, Appareils nouveaux pour la méthode graphique. 12. Passy, Revue générale sur les sensations olfactives. 13. Henri, Revue générale sur l'erreur probable. 14. Henri, Revue générale sur la mesure de la sensibilité tactile. 15. Binet et Henri, Revue générale sur la psychologie individuelle. 16. Azoulay, Revue générale sur les conclusions psychologique des derniers travaux sur la structure du système nerveux. 17. Binet, Revue génèrale sur les expériences de plethysmographie.

DR. JAMES WARD, of Cambridge, England, writes a private note to one of the editors (apropos of a reference to him in a book review), which has a certain historical interest as well as the purely personal one. He says: "In your excellent Review (Nov., 1895, p. 608) I am charged with 'virulence' and 'acridity' in criticizing the 'new psychology.' The words seem to me to be unfair and ill-chosen. It is odd that I who did my level best to get a psychophysical laboratory started here before there was a single such laboratory in existence—unless Wundt's then private laboratory is to count—should be counted the enemy of pyschophysics. The very first thing I ever wrote was a monograph on the Relation of Physiology to Psychology, and before 1880 I had spent two years in physiological laboratories. What I object to is psychophysics by men who are not psychologists."

THE psychological department of Cornell University has moved to Morrill Hall, where it is said to have nine rooms and 4,000 square feet of floor space. The Psychological Laboratory of the University

of Nebraska has been moved into the first floor of the new library building and occupies a series of five rooms with a floor space of 3,000 square feet. In the new biological buildings which the University of Chicago will erect with a part of the $1,000,000 given by Miss Culver, ample provision will be made for the Psychological Laboratory. In the new Schemerhorn Hall of Natural Sciences to be erected for Columbia University at a cost of about $400,000, more than one-tenth of the building is allotted to psychology.

DR. C. A. STRONG, associate professor of psychology in the University of Chicago, has been elected lecturer on Psychology in Columbia University.

H. C. WARREN, M. A., has been appointed assistant professor of Experimental Psychology in Princeton University.

LEOPOLD VOSS, Hamburg and Leipzig, has begun the publication of a new *Archiv* called *Kantstudien*, edited by Dr. Hans Vaihinger, of the University of Halle, with the coöperation of E. Adickes, E. Boutroux, Edw. Caird, C. Cantoni, J. E. Creighton, W. Dilthey, B. Erdmann, K. Fischer, M. Heinze, R. Reicke, A. Riehl and W. Windelband. The journal will treat not only Kant's contributions to philosophy, but also the general development of modern philosophy in its relations to Kant. Contributions (which may be in English) are invited by the editor.

A NEW Russian journal, a Review of Psychiatry, Neurology and Experimental Psychology, edited by Dr. Bekhteret, will hereafter be published monthly.